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Ontario Geological Survey
Open File Report 6060

# Results of Regional Till Sampling for Kimberlite and Base Metal Indicator Minerals, Peterlong Lake–Radisson Lake Area, Northeastern Ontario

2001

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ONTARIO GEOLOGICAL SURVEY

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# Results of Regional Till Sampling for Kimberlite and Base Metal Indicator Minerals, Peterlong Lake–Radisson Lake Area, Northeastern Ontario

by

A.F. Bajc and D.C. Crabtree

2001

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## ABSTRACT

During the 1995 and 1996 field seasons, detailed Quaternary geology mapping and regional c-horizon till sampling were undertaken within the Peterlong Lake and Radisson Lake 1:50 000 scale National Topographic System (NTS) map areas as well as within a group of 4 townships adjoining the southeastern corner of the Radisson Lake map area. The project was undertaken as part of an ongoing program of Quaternary geology mapping and surficial geochemistry within the Abitibi greenstone belt designed to further evaluate the mineral resource potential of the region.

The results of gold grain processing and geochemical determinations performed on till samples collected as part of this project have been previously reported in Ontario Geological Survey Open File Reports 5941 (Bajc 1996), 5942 (Bajc et al. 1996) and 5957 (Bajc 1997). This report contains the results of analyses performed on 400 heavy mineral concentrates processed for their kimberlite and base metal indicator mineral content.

Quaternary mapping helped to characterize the surficial materials present within the study area and to reconstruct the ice flow history associated with these deposits. This information provided a framework by which the regional materials compositional datasets could be interpreted. The regional sampling program provided information on the background concentrations of various indicator minerals present in till.

Although the tenor of kimberlite indicator mineral response is low within the survey area, there appears to be a spatial pattern of occurrence that suggests a local source for the grains. Linear clusters of samples containing indicator minerals have been identified and may be associated with structural features present within the survey area. Stream and esker sampling programs are suggested to confirm the results presented herein and to more fully evaluate the region. Higher density till sampling within anomalous areas should be undertaken to refine exploration targets.

The metamorphic/magmatic massive sulphide indicator mineral (MMSIM®*) dataset clearly delineates the position of favourable host rocks for base metal mineralization. These are defined, in many instances, by multiple indicator mineral species and supported by till geochemistry. Higher density till sampling and prospecting is recommended within these anomalous areas to determine their significance and focus exploration.

A complete digital dataset, consisting of locational information, heavy mineral assemblages, KIM and MMSIM® grain counts and microprobe data is being released in conjunction with this report as Ontario Geological Survey Miscellaneous Release-Data 78 (Bajc and Crabtree 2001).

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*MMSIM is a registered trademark of Overburden Drilling Management Limited, Nepean, Ontario

# Results of Regional Till Sampling for Kimberlite and Base Metal Indicator Minerals, Peterlong Lake-Radisson Lake Area, Northeastern Ontario.

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## INTRODUCTION

During the 1995 and 1996 field seasons, detailed Quaternary geology mapping and regional c-horizon till sampling were undertaken within the Peterlong Lake and Radisson Lake 1:50 000 scale National Topographic System (NTS) map areas as well as within a group of 4 townships adjoining the southeastern corner of the Radisson Lake map area (Figure 1). The project was undertaken as part of an ongoing program of Quaternary geology mapping and surficial geochemistry within the Abitibi greenstone belt designed to further evaluate the mineral resource potential of the region.

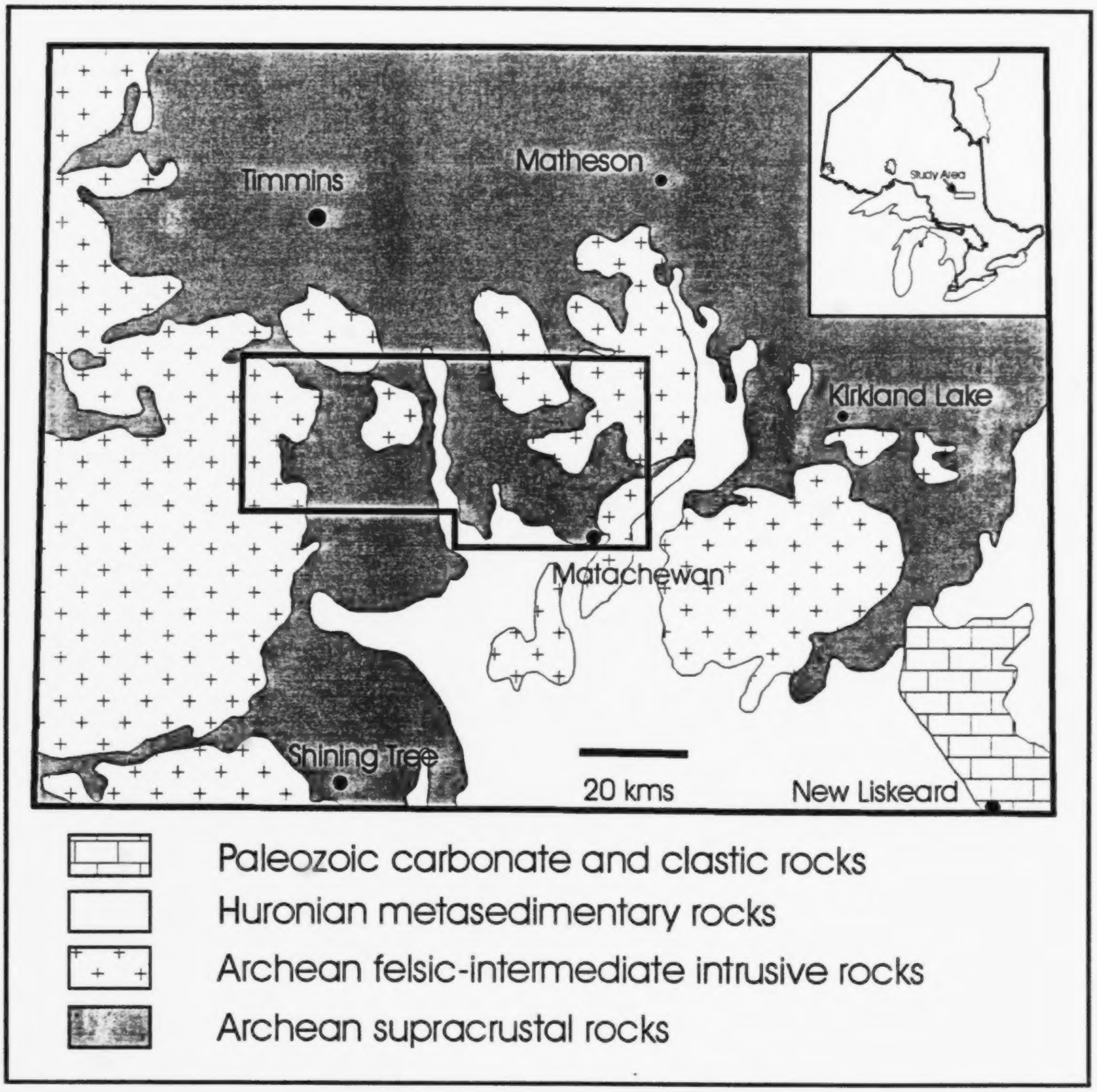
Timmins
Matheson
Study Area
Kirkland Lake
Matachewan
Shining Tree
20 kms
New Liskeard
Paleozoic carbonate and clastic rocks
Huronian metasedimentary rocks
Archean felsic-intermediate intrusive rocks
Archean supracrustal rocks

**Figure 1.** Location map of study area including regional bedrock geology.

The results of gold grain processing and geochemical determinations performed on till samples collected as part of this project have been previously reported in Ontario Geological Survey Open File Reports 5941 (Bajc 1996), 5942 (Bajc et al. 1996) and 5957 (Bajc 1997). This report contains the results of analyses performed on 400 heavy mineral concentrates processed for their kimberlite and base metal indicator mineral content.

The study area is situated along the southern edge of the Abitibi Subprovince, approximately 25 km south of Timmins, 35 km west of Kirkland Lake and 50 km north of the hamlet of Shining Tree. The town of Matachewan is situated in the southeastern corner of the study area (Figure 1).

## REGIONAL GEOLOGY

### Precambrian Geology

Knowledge of the bedrock geology of the study area is derived almost exclusively from township-scale mapping completed by the Ontario Geological Survey (Moore 1966; Lovell 1967, 1971; Pyke 1973, 1978a, 1978b; Bright 1984; Jensen 1990, 1992, 1993, 1995; Kresz 1993; Vaillancourt 1999). Information on the bedrock geology of McKeown, Fripp, Doyle, Musgrove, Hassard, Gouin, Sheba and Dunmore townships is derived primarily from reconnaissance mapping.

The study area is largely underlain by Archean granite-greenstone terrane of the Abitibi Subprovince (Figure 2). Proterozoic metasedimentary rocks of the Cobalt Embayment conceal the Archean basement along the southeastern corner of the study area as well as within a narrow, north-trending corridor that bisects the study area. Archean supracrustal rocks belong to the Bartlett, Peterlong, Bowman, Geikie and Watabeag assemblages and are dominated by metavolcanic lithologies (Jackson and Fyon 1991). Three compositional classes of metavolcanics have been recognized. These include: 1) a calc-alkalic suite; 2) a tholeiitic suite, which includes both Fe-rich and Mg-rich end members; and 3) a komatiitic suite. Timiskaming-type metasedimentary rocks occur in Powell and Cairo townships and have been traced eastward, along Highway 66, into northwestern Flavelle Township. Large batholiths and stocks of felsic to intermediate composition intrude the supracrustal successions. The most notable of these include the Kenogamissi and Watabeag batholiths, which are located on the western and eastern margins of the study area, respectively and the much smaller Adams, Geikie, Blackstock and Cairo intrusions (Figure 2). Numerous syenitic intrusions and dikes, the most notable of which is the Cairo Stock, occur throughout the map area. A large elongate, possibly layered, mafic intrusion, referred to as the Muskasenda gabbro, occupies portions of English, Beemer and Bartlett townships. Proterozoic metasedimentary rocks belong to the Huronian Supergroup and consist of relatively flat-lying mudstones, wackes and conglomerates of the Gowganda Formation (Cobalt Group).

Although there are presently no operating mines within the survey area, excellent potential for further mineral discoveries is evidenced by the wide distribution of a large variety of mineral

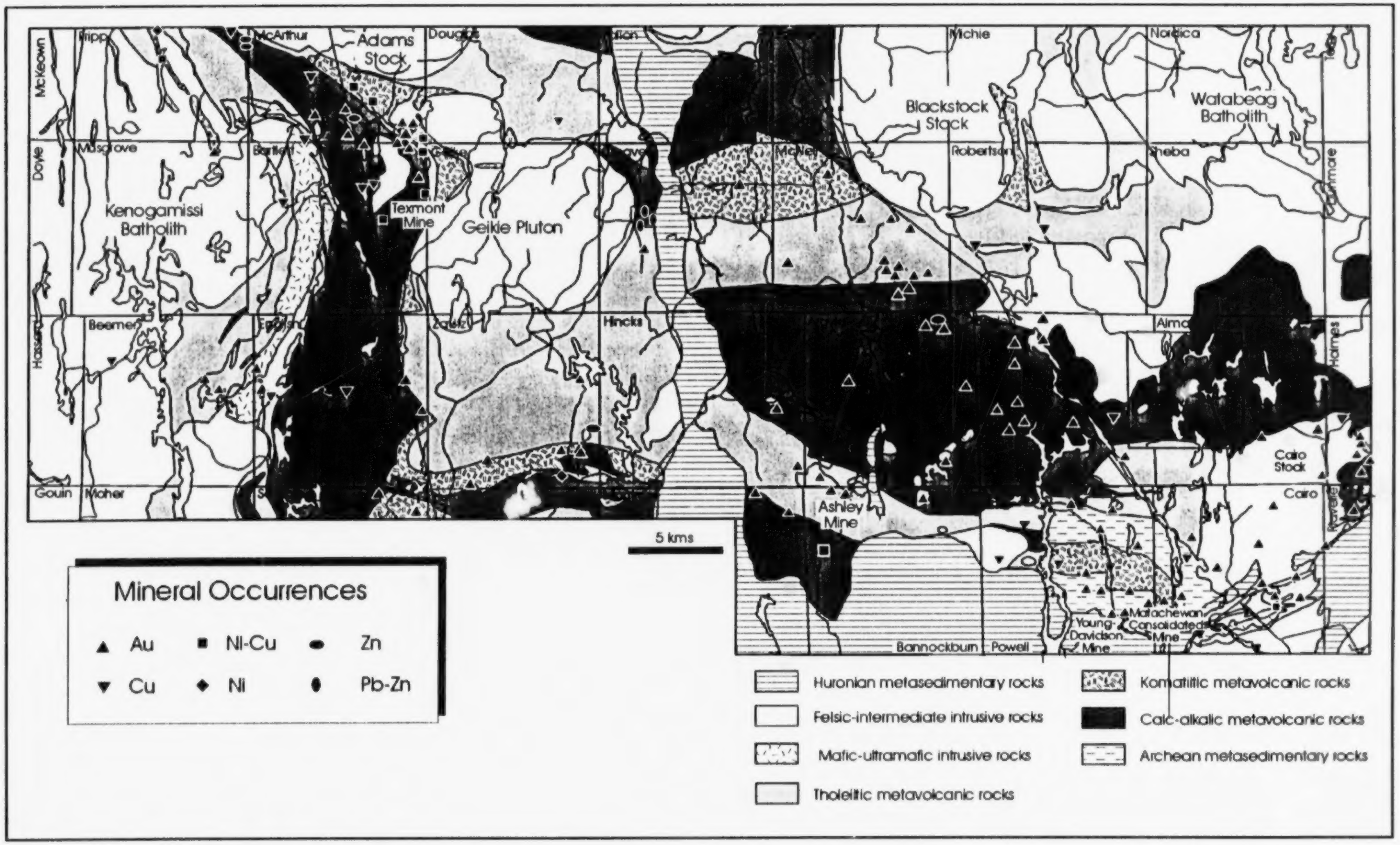
McKeown
Tripp
McArthur
Adams Stock
Douglas
Michie
Nordica
Blackstock Stack
Watabeag Batholith
Doyle
Musgrove
Bartlett
Robertson
Sheba
Dunmore
Kenogamissi Batholith
Texmont Mine
Geikie Pluton
Hassard
Beemer
Zavitz
Hincks
Alma
Holmes
Cairo Stock
Gouin
Moher
Ashley Mine
Cairo
Revell
5 kms
Bannockburn
Powell
Young-Davidson Mine
Matachewan Consolidated Mine
Mineral Occurrences
▲ Au
■ Ni-Cu
● Zn
▼ Cu
◆ Ni
● Pb-Zn
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

**Figure 2.** Bedrock geology and mineral occurrences of the study area.

occurrences (Figure 2). This is further supported by the occurrence of several past-producing mines in and around the study area as well as the persistent activities of mineral exploration companies and prospectors over the past number of decades.

Notable past producers within the study area include: 1) the Texmont Mine in east-central Bartlett Township; a komatiite-hosted Ni-Cu-PGE deposit; 2) the Young-Davidson and Matachewan Consolidated mines in southeastern Powell Township, Au deposits spatially associated with the Larder Lake-Cadillac Break; and 3) the Ashley Mine in northwestern Bannockburn Township, a small Au deposit hosted by quartz veins cutting sheared, mafic metavolcanic rocks (Figure 2). The Redstone, Hart, McWatters and Langmuir komatiite-hosted Ni deposits are situated on the southern flank of the Shaw Dome just north of the study area.

## Quaternary Geology

### *Physiography*

The study area lies within the Abitibi Upland physiographic region (Bostock 1970). It is characterized as a low relief, bedrock-dominated peneplain with isolated, lithologically controlled topographic uplands. Elevations range between 290 and 520 m asl. Steep, north- and west-facing escarpments along the fringes of the Huronian embayment form cliffs up to 75 m in height. Relief within a portion of Fallon, Fasken, Cleaver and McNeil townships, centred on the Nighthawk and Whitefish river drainage basins, is generally much less than 15 m. In this area, thick, fine-grained glaciolacustrine deposits are responsible for a relatively flat, poorly drained region characterized by swampy conditions.

### *Ice Flow Record*

Ice-flow indicators, consisting of glacial grooves and striae, chattermarks, roches moutonnées, crag and tail features and glacial flutings in areas of thick, continuous till, have been observed within the study area (Figure 3). Together, these features indicate a fairly consistent late-glacial pattern of ice flow directed toward the south to southeast. Glacial flutings developed on ground moraine as well as pebble fabric measurements from surface exposures of subglacial till are consistent with this observation. At numerous sites, however, crossing striae record a sequence of ice flow events that both predate and postdate the main ice-flow event. Protected facets of numerous bedrock outcrops preserve the striae of older ice-flow events directed towards the south, southwest or west. Composite glacial landforms and mapped dispersal patterns of distinctive Huronian metasedimentary pebbles (Bajc 1995) support the interpretation of an older, westerly to southwesterly ice-flow event as well. A similar ice-flow chronology has been documented for much of northeastern Ontario (Veillette and McClenaghan 1996).

Younger ice flow indicators that deviate from the main south-southeast direction reflect the late stage thinning of the ice sheet. For example, bedrock-controlled topographic obstructions

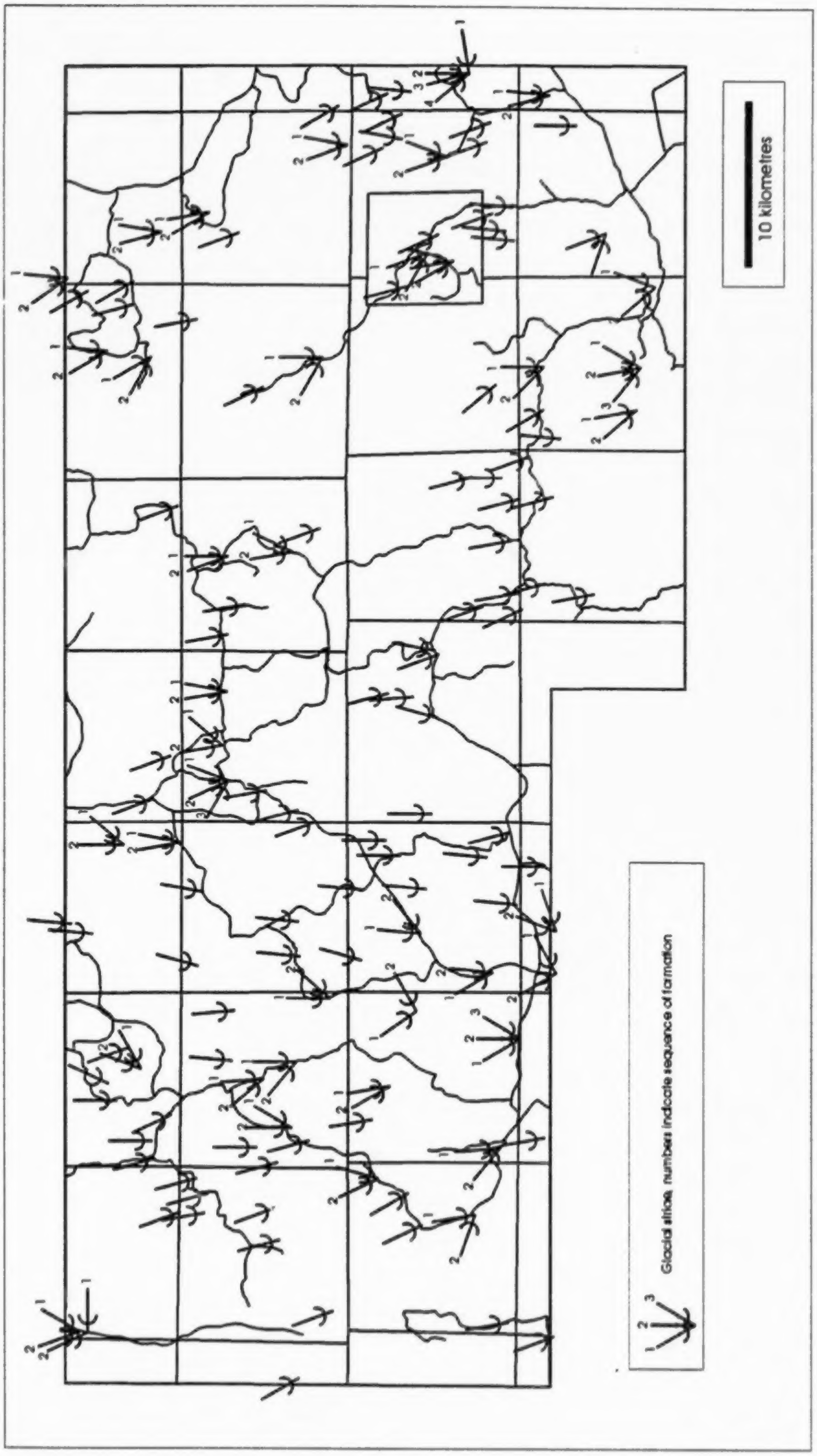
Glacial striae, numbers indicate sequence of formation
1
2
3
10 kilometres

**Figure 3.** Ice flow record of the study area derived from glacial striae.

have resulted in local deflections of flow. Likewise, large esker-fan complexes, as occur in English Township, have resulted in converging striae within a restricted zone adjacent to the axis of the esker and its re-entrant. These late stage shifts in flow do not appear to have resulted in the dispersal of significant amounts of material. Their significance, in terms of drift prospecting programs and associated dispersal studies, is regarded as minimal.

### *Surficial Deposits*

Most upland regions within the survey area are characterized by either bare bedrock or a thin, discontinuous till cover with isolated pockets of thick till (Figure 4). There are, however, areas where extensive till cover masks the underlying bedrock topography. In these areas, the till forms gently undulating ground moraine and, in some cases, fluted till plains. Till was deposited primarily by lodgement and/or meltout processes or as ice-marginal debris flows. It is typically, stony, silty to sandy and contains low matrix carbonate. Compositionally, the till tends to closely reflect the underlying bedrock geology. There are, however, isolated occurrences of fine-textured, stone-poor, carbonate-rich till observed within the survey area. The most notable and extensive area of this facies is located within west-central Musgrove Township and east-central Doyle Township. This area is well defined by the Ca content in the -63 micron fraction of till matrix (Bajc et al. 1996). This highly concentrated carbonate debris was probably derived from the Hudson Bay Lowland and was transported to the depositional site either englacially or supraglacially, resulting in little to no dilution by local bedrock lithologies. Alternatively, an unmapped outlier of Paleozoic carbonate rocks may exist nearby, in the up-ice direction, within a lake basin or beneath thick drift cover.

Deposits of glaciofluvial and glaciolacustrine sediments occur in structurally controlled valleys throughout the study area, as well as in broad basinal settings, as occur in the northeastern corner and north-central portions of the study area (Figure 4). Deposits of eolian sand and peat quite often cap the sediment sequence within these areas. The bedrock surface is covered by variable thicknesses of sediment that often ranges up to several tens of metres. Till, if present at all, occurs beneath a substantial thickness of stratified sediment and is not attainable using conventional surface sampling techniques. Detailed 1:50 000 scale Quaternary geology maps of the Radisson Lake and Peterlong Lake NTS map areas provide additional information on the distribution of surficial materials within the study area (Bajc and Paterson 2000a, 2000b)

## SAMPLE COLLECTION, PROCESSING AND ANALYSIS

Four-hundred c-horizon till samples were processed for their kimberlite and base metal indicator mineral content (Figure 5). Sample density is highest within bedrock-dominated areas and diminishes within areas containing thick deposits of stratified glaciofluvial and/or glaciolacustrine deposits. Sampling density averages approximately 1 sample per 5.5 km$^2$. Details of sample collection are contained in Ontario Geological Survey Open File Reports 5941 (Bajc 1996), 5942 (Bajc et al. 1996) and 5957 (Bajc 1997).

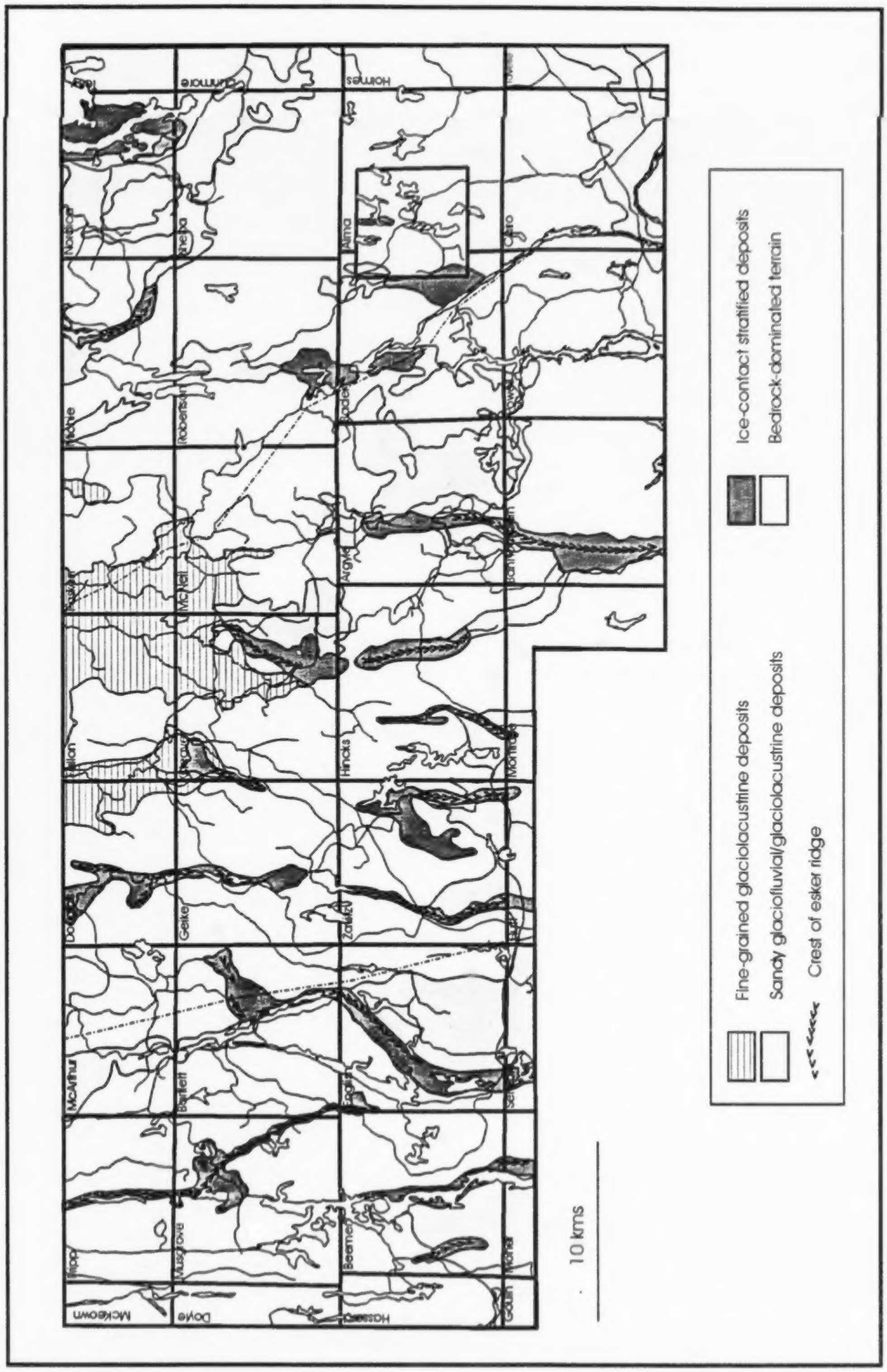
McKeown
Doyle
Hassard
Godin
Tripp
Musgrove
Beemer
Marier
McArthur
Bartlett
Egan
Semple
Geikie
Zavitz
Hincks
McNeil
Argyle
Robertson
Sheba
Alma
Holmes
10 kms
Fine-grained glaciolacustrine deposits
Sandy glaciofluvial/glaciolacustrine deposits
Crest of esker ridge
Ice-contact stratified deposits
Bedrock-dominated terrain

Figure 4. Simplified Quaternary geology map of the study area.

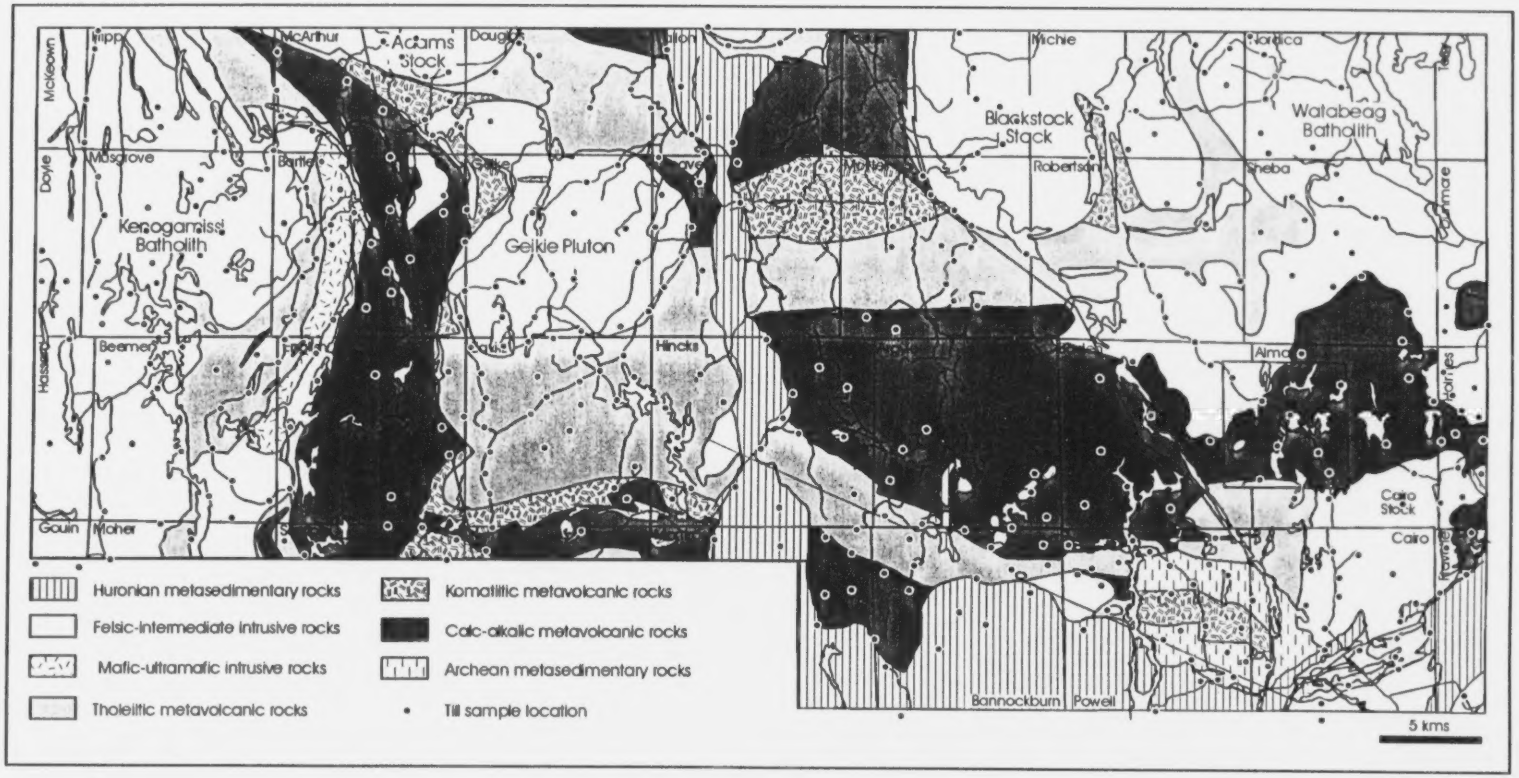
Mckeown
McArthur
Adams Stock
Michie
Blackstock Stock
Watabeag Batholith
Doyle
Musgrove
Bartlett
Robertson
Sheba
Dunmore
Kenogamissi Batholith
Geikie Pluton
Hassard
Beemer
Hincks
Alma
Gouin
Maher
Cairo Stock
Cairo
Bannockburn
Powell
5 kms
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks
Till sample location

**Figure 5.** Till sample location map.

Heavy mineral processing of 8 to10 kg bulk, c-horizon till matrix (-5 mm) samples was performed by Overburden Drilling Management Limited of Nepean, Ontario during the fall of 1995 and 1996. All samples submitted as part of the 1995 and 1996 field programs (594 samples) were initially processed for their gold grain content by single-pass, wet gravity tabling. The gold grain count of samples containing 10 or more "tabled grains" (i.e., grains observed on the table) was refined by panning the "table concentrate". The "table concentrate" was further concentrated to >3.2 S.G. using density-dependent settling in methylene iodide. Four-hundred of these heavy mineral concentrates (HMCs) were subsequently processed during the spring of 1997 for their kimberlite and base metal indicator mineral content. Ferromagnetic minerals were isolated from the HMCs using an automagnet. The non-ferromagnetic fraction was dry sieved at 0.25, 0.5 and 1.0 mm. The –0.25 mm fraction was not examined. A paramagnetic separation was performed on the 0.25-0.5 mm fraction using a Carpco paramagnetic separator to assist with the segregation of indicator minerals. Kimberlite indicator minerals (KIMs) and selected/representative base metal indicator minerals, collectively referred to as metamorphic/magmatic massive sulphide indicator minerals (MMSIMs®) by Overburden Drilling Management Limited, were isolated from these fractions, stored in vials and shipped to the Ontario Geological Survey (OGS) for microprobe analysis.

Indicator minerals associated with kimberlite are listed in Table 1 and consist of: 1) 3 species of garnets, namely, peridotitic Cr-pyrope, eclogitic pyrope-almandine and megacrystic Cr-poor pyrope; 2) Mg-ilmenite; 3) chromite; and 4) chrome diopside. Mg-rich olivine (forsterite) and orthopyroxene (enstatite) often occur in association with, although not strictly limited to, kimberlite (Averill 1999). These minerals were not isolated as part of the indicator mineral picking. The chemistry of several of these mineral species can provide valuable information on the potential fertility of their source kimberlites (Gurney and Moore 1993; Fipke et al. 1995; Morris et al. 2000). This information will be summarized in the discussion of results.

**Table 1.** Kimberlite indicator minerals, their end member chemical formulae and associated geochemical criteria by which they are evaluated.

| Indicator Mineral | Chemical Formula | Definition |
|---|---|---|
| | | |
| peridotitic high-Cr pyrope | $Mg_3Al_2Si_3O_{12}$ | $CaO$-$Cr_2O_3$ binary plot (Dawson and Stephens 1975) |
| megacryst low-Cr pyrope | $Mg_3Al_2Si_3O_{12}$ | $Na_2O$-$TiO_2$ binary plot (Schultze 1999) |
| eclogitic pyrope-almandine | $Fe_3Al_2Si_3O_{12}$ | $Na_2O$-$TiO_2$ binary plot (Schultze 1999) |
| Mg-ilmenite | $FeTiO_3$ | $MgO$-$Cr_2O_3$ binary plot (Gurney and Moore 1991) |
| chromite | $(Fe,Mg)(Cr,Al)_2O_4$ | $TiO_2$-$Cr_2O_3$ and $MgO$-$Cr_2O_3$ binary plots (Fipke et al. 1995) |
| chrome diopside | $Ca(Mg,Cr)Si_2O_6$ | $Cr_2O_3$-$Al_2O_3$-$Na_2O$ ternary plot (Morris et al. 2000) |
| Mg-rich olivine (forsterite) | $Mg_2SiO_4$ | Forsteritic Number-$SiO_2$ binary plot |
| orthopyroxene (enstatite) | $(Mg,Fe)_2Si_2O_6$ | - |

Indicator minerals associated with metamorphic/magmatic massive sulphide deposits can be subdivided into 3 main groupings. These include: 1) heavy minerals formed by recrystallization of volcanosedimentary massive sulphide deposits and their alteration halos during high-grade regional metamorphism; 2) heavy minerals generated by thermal metamorphism and metasomatism (skarns and griesens); and 3) heavy minerals formed by alteration processes associated with the separation of Ni-Cu sulphides from ultramafic magmas and komatiites (Averill 1999). Indicator minerals associated with each of these groupings are listed in Table 2.

## RESULTS AND INTERPRETATION

The non-magnetic heavy mineral concentrates are dominated by a suite of minerals typical of Archean granite-greenstone terrane. The paramagnetic fraction is dominated by the minerals almandine, augite and hornblende. A progression from hornblende- to almandine- to augite-dominated assemblages occurs as one proceeds easterly across the study area. Local deviations from this trend have been observed. Hornblende occurs at high concentrations over the western end of the study area in an area underlain by hornblende-biotite trondhjemite of the Kenogamissi Batholith. The hornblende-dominated assemblage gives way to almandine over the west-central and east-central portions of the study area. Almandine is a ubiquitous metamorphic mineral and is likely derived from sources both within and distal to the study area. The eastern third of the study area is dominated by augite. This clinopyroxene is most likely liberated from felsic-intermediate intrusive rocks of alkalic affinity. An example of such an intrusion within this area is the Cairo Stock. Portions of the Watabeag Batholith, to the northeast, exhibit alkalic character as well. Augite also dominates the paramagnetic heavy mineral fraction of several till samples collected from the southeastern corner of Beemer Township where till geochemistry supports an alkalic affinity for the underlying felsic-intermediate intrusion. A couple of till samples contained a paramagnetic heavy mineral assemblage dominated by olivine. These include a sample collected from the Fripp-McArthur township line (95-AFB-547) and a second sample collected from east-central English Township (95-AFB-620). In both cases, it would appear that the source of the olivines is komatiitic metavolcanic rocks since there is a spatial association between them.

The non-magnetic fraction of the heavy mineral concentrates are dominated by diopside, epidote and titanite (sphene). Variations occur in the relative proportions of these 3 minerals across the study area. Epidote is ubiquitous because of its common occurrence in regionally metamorphosed rocks marking the transition from greenschist to epidote-amphibolite facies metamorphism. Diopside dominates the non-magnetic heavy mineral signature of till samples collected over the west-central and northeastern parts of the study area. The concentration of diopside throughout the west-central part of the study area may result from an abundance of mafic and ultramafic metavolcanic rocks within and to the north of this region. The abundance of diopside in till samples collected over the Watabeag Batholith is puzzling. A multi-phased intrusion of mafic to ultramafic composition does, however, exist just north of the study area in the northwestern part of Nordica Township. This intrusion may be, in part, responsible for the diopside signature. The non-magnetic heavy mineral fraction of numerous till samples collected over the syenitic Cairo Stock are dominated by titanite. This calcium-titanium silicate is a common accessory mineral of alkalic/syenitic intrusive rocks. Its abundance within this region is not unexpected.

**Table 2.** List of indicator minerals commonly associated with base metal mineralization (from Averill 1999). Shaded areas indicate mineral species related to deposit type.

| *Indicator Mineral* | *MVMS* | *Mag Ni-Cu* | *Skarn* | *Greisen* |
|---|---|---|---|---|
| *anthophyllite* | ▨ | | | |
| *barite* | ▨ | | | |
| *cassiterite* | | | | ▨ |
| *chalcopyrite* | ▨ | ▨ | ▨ | ▨ |
| *chromite* | | ▨ | | |
| *cinnabar* | ▨ | | | |
| *corundum* | ▨ | | | |
| *Cr-rutile* | ▨ | ▨ | | |
| *dumortierite* | ▨ | | | |
| *fluorite* | | | | ▨ |
| *forsterite olivine* | | | ▨ | |
| *franklinite* | ▨ | | | |
| *gahnite* | ▨ | | | |
| *grossular* | | | ▨ | |
| *hercynite* | | ▨ | | |
| *johannsenite* | | | ▨ | |
| *knebelite olivine* | | | ▨ | |
| *kyanite* | ▨ | | | |
| *loellingite* | ▨ | ▨ | | |
| *low-Cr diopside* | | ▨ | | |
| *Mg-spinel* | ▨ | | | |
| *Mn-epidote* | ▨ | | | |
| *native gold* | ▨ | | ▨ | ▨ |
| *olivine* | | ▨ | | |
| *orthopyroxene* | ▨ | ▨ | | |
| *PGE alloys* | | ▨ | | |
| *rammelsbergite* | | ▨ | | |
| *sapphirine* | ▨ | | | |
| *scheelite* | | | ▨ | |
| *sillimanite* | ▨ | | | |
| *sperrylite* | | ▨ | | |
| *spessartine* | ▨ | | | |
| *staurolite* | ▨ | | | |
| *topaz* | | | | ▨ |
| *tourmaline* | ▨ | | | ▨ |
| *uvarovite* | | ▨ | | |
| *vesuvianite* | | | ▨ | |
| *willemite* | ▨ | | | |
| *wolframite* | | | | ▨ |

**MVMS:** *metamorphosed volcanosedimentary massive sulphide mineralization.*
**Mag Ni-Cu:** *magmatic nickel-copper massive sulphide mineralization.*

## Kimberlite Indicator Minerals

Regional heavy mineral surveys form an important component of diamond exploration programs in glaciated regions of the world. In Ontario, the most common sediments sampled in heavy mineral surveys include fluvial and glaciofluvial deposits (i.e., stream sediments, eskers and outwash deposits), beach deposits and till. The premise behind sampling these first and second order derivative sediments is that the dispersal train of indicator minerals derived from kimberlite, a common host rock for diamonds, will be significantly larger than the kimberlite pipes themselves. Fluvial and glaciofluvial deposits provide a much broader picture of the diamond potential of a given region than do till sampling surveys. The results presented in this report are derived exlusively from basal till samples collected as part of the regional sampling program. The results should therefore be interpreted with caution in that the sampling density is probably not at a high enough level to adequately evaluate the region for its diamond potential.

Diamonds commonly form in upper mantle-derived peridotite and eclogite where it is sampled by kimberlitic magma prior to its ascent to the surface in a kimberlite pipe. In addition to diamond, a number of other xenocrysts, that occur at a much higher concentration, are brought to surface in the kimberlite magma where they are eroded and redistributed by glacial and non-glacial processes. Xenocrysts associated with peridotitic source rocks include Cr-pyrope garnet, chromite and Cr-diopside. Pyrope-almandine garnets occur as xenocrysts in eclogitic source rocks. The megacrystic suite, consisting of Mg-ilmenite and Cr-poor pyrope garnets, is believed to be a high pressure cognate assemblage derived from the kimberlite magma. These megacryst phases are considered important KIMs although not to the same extent as those associated with the peridotitic and eclogitic suite. Table 1 lists the important kimberlite indicator minerals, their chemical formulae and geochemical criteria by which they are evaluated.

### *Peridotitic Suite*

#### *Cr-Pyrope Garnets*

A high proportion of garnet xenocrysts recovered from kimberlites in South Africa and North America are derived from peridotite (Schultze 1999). Eighty-five percent of the peridotitic Cr-pyropes that occur as inclusions in diamond are Ca-depleted, Cr-enriched and of harzburgitic composition. These xenocrysts are referred to as “G10 garnets” and are one of the most valuable indicators of diamondiferous kimberlite. More calcic, Cr-pyrope garnets of kimberlitic affinity are referred to as “G9 garnets” and rarely occur as inclusions in diamond. These garnets are derived from peridotite of lherzolitic composition.

Thirteen pyrope garnet grains were recovered as part of the regional sampling program. With the exception of a single garnet grain recovered from sample 95-AFB-171, all grains fall well within the G9 field of the $CaO-Cr_2O_3$ binary diagram of Dawson and Stephens (1975) (Figure 6). This grain is the most Ca depleted containing 4.26 wt% CaO. It was collected from north-central Powell Township just east of Mistinikon Lake (Figure 7). Sample 96-AFB-044 contained 2 G9

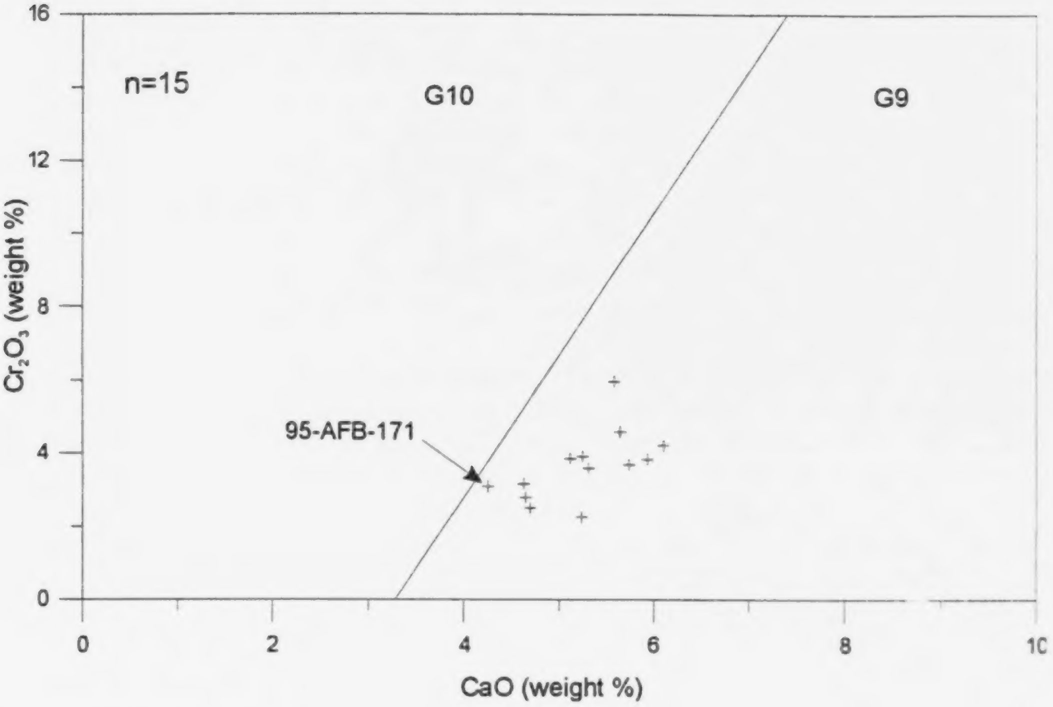

**Figure 6.** CaO-$Cr_2O_3$ binary plot for pyrope garnet (from Dawson and Stephens 1975).

pyrope garnets. This sample was collected from the northeastern corner of Bannockburn Township. Both of these samples were collected adjacent to the Galer Lake Branch of the Larder Lake-Cadillac Break, a major structural break along which economic deposits of gold are situated. Interestingly, 3 additional G9 pyrope garnets were recovered further to the east and south in Powell and Cairo townships in close proximity to the same break. The 7 remaining pyrope garnets appear to be randomly distributed throughout the study area (Figure 7).

### *Chromite*

Inclusions of chromite from diamond are easily distinguished from crustal chromites by their elevated $Cr_2O_3$ and MgO contents. These "inclusion field" chromites contain greater than 61 wt % $Cr_2O_3$ and 12 to 16 wt % MgO (Gurney 1984, Fipke et al. 1995). They are also characterized by very low $TiO_2$ contents, generally occuring at less than 0.6 wt %. Lawless (1974), Sobolev (1977) and Dong and Zhou (1980) have suggested a $Cr_2O_3$ threshold of 62.5 wt % for chromites associated with diamond. A $Cr_2O_3$-$TiO_2$ binary diagram (Figure 8a) is useful for identifying those chromites unique to kimberlite and lamproite as well as those unique to the diamond inclusion and intergrowth field (Fipke et al. 1995).

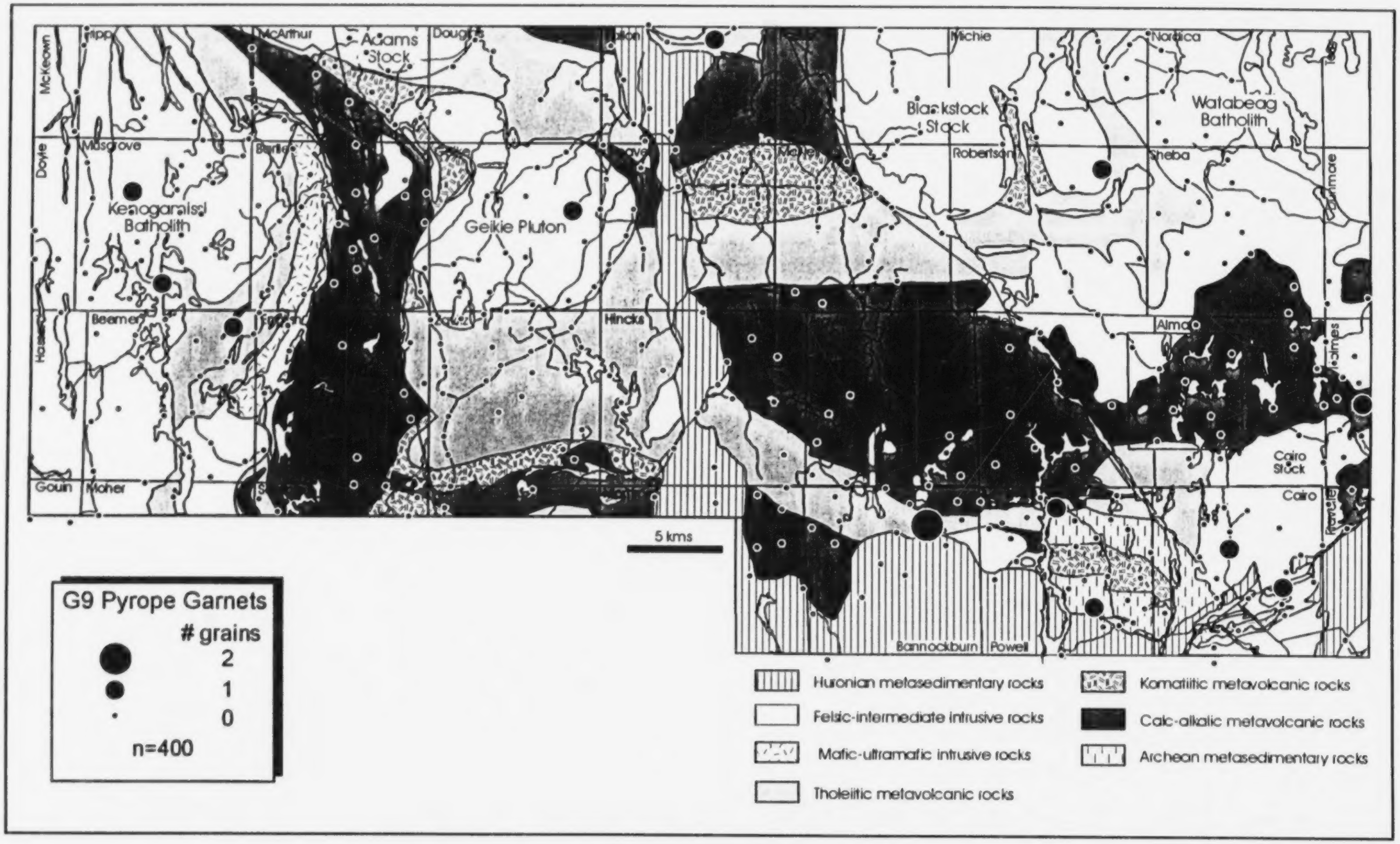
G9 Pyrope Garnets
# grains
2
1
0
n=400
5 kms
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks
Adams Stock
Kenogamissi Batholith
Geikie Pluton
Blackstock Stock
Watabeag Batholith
Cairo Stock
McKeown
Doyle
Hassard
Gouin
Maher
Musgrove
Beemer
Hipp
McArthur
Douglas
Michie
Robertson
Sheba
Nordica
Dunmore
Alma
Holmes
Cairo
Hincks
Bannockburn
Powell

Figure 7. Regional distribution of G9 pyrope garnets.

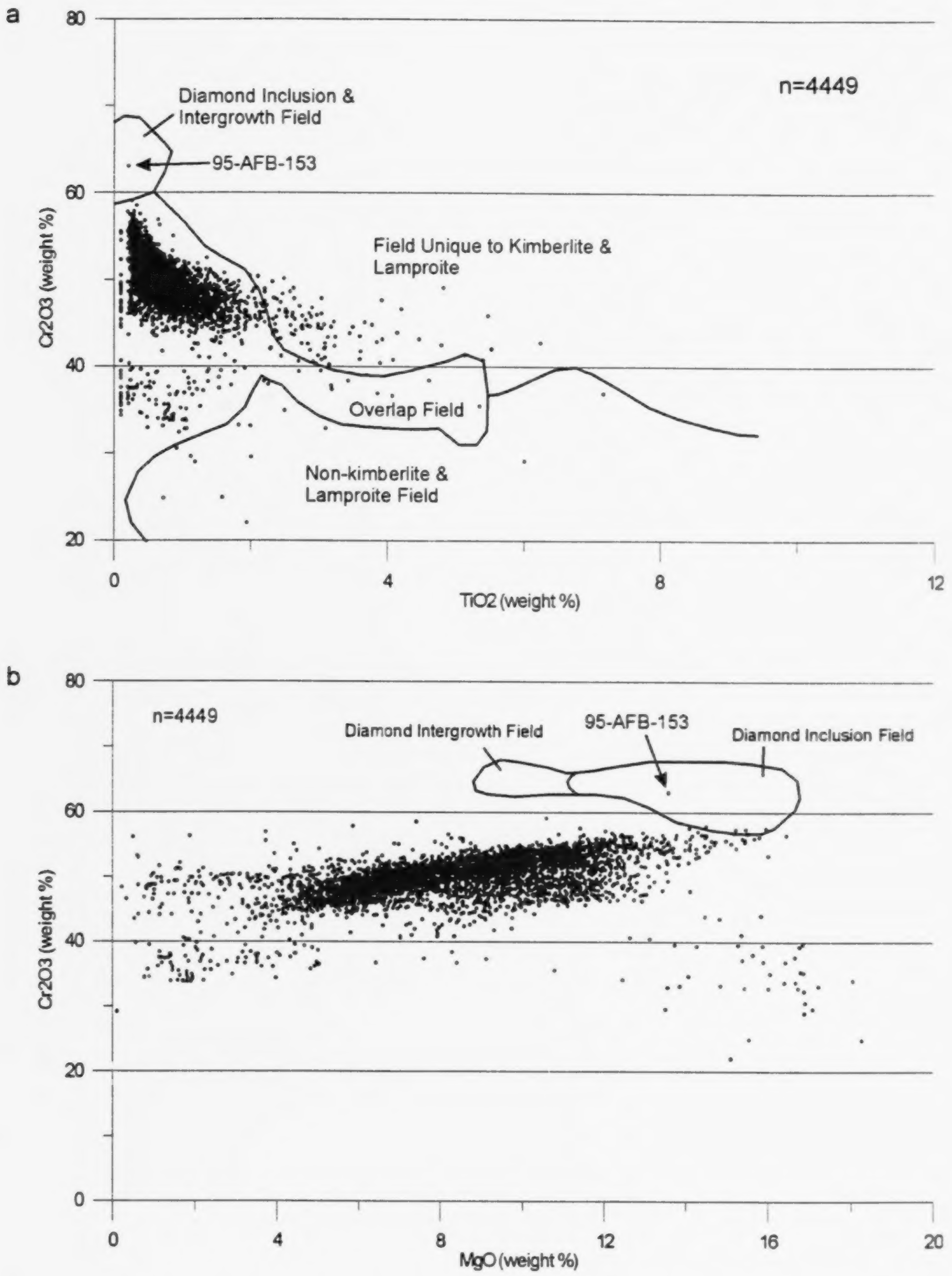

**Figure 8a.** $Cr_2O_3$-$TiO_2$ binary plot for chromite; **8b.** $Cr_2O_3$-MgO binary plot for chromite (from Fipke et al. (1995).

Approximately 4450 representative chromite grains of an estimated 16 000 counted as part of the heavy mineral processing were microprobed at the Ontario Geoscience Laboratories. One of these grains (95-AFB-153) lies well within the diamond inclusion and intergrowth field of the $Cr_2O_3$-$TiO_2$ binary plot of Fipke et al. (1995) (Figure 8a) and a second grain (95-AFB-248) lies on the outer margin of this field. This second grain's MgO content (10.58 wt %) is fairly low suggesting that it should not be classified as a diamond inclusion or intergrowth field chromite. Several chromite grains plot within the diamond inclusion field of the $Cr_2O_3$-MgO binary plot of Fipke et al. (1995) (Figure 8b). These were isolated from samples 95-AFB-018, 021, 071, 153, 623, 639 and 96-AFB-044. All but a single grain from sample 95-AFB-153 are marginal diamond inclusion field chromites. Figure 9 shows the distribution of diamond inclusion field chromites within the study area. Sample site 95-AFB-153 is situated in west-central McNeil Township. Five grains cluster in the Semple, Zavitz, English and Bartlet townships region and a single grain was isolated from a sample collected from northeastern Bannockburn Township which also contained 2 G9 pyrope garnets.

Eighty-nine chromite grains classified as unique to the kimberlite and lamproite field of the $Cr_2O_3$-$TiO_2$ binary plot (Figure 8a) were recovered from the study area. Figure 10 shows the regional distribution of grains with this affinity. A well defined linear cluster of samples extending from southwestern Fallon Township in the north to northwestern Hutt Township in the south has been recognized. The significance of this cluster has yet to be determined. A significant northeast-trending structure coincident with this anomaly has been depicted on various geological maps (e.g., Ontario Geological Survey 1991). Single sample sites containing anomalous numbers of chromites unique to kimberlite and lamproite are also situated in northeastern Beemer Township and central Musgrove Township.

Ninety-eight percent of the chromite grains picked for microprobe analysis lie within the overlap field of the $Cr_2O_3$-$TiO_2$ binary plot. The authors believe that a high proportion of these grains are derived from crustal rocks of ultramafic affinity. Komatiitic metavolcanic rocks are common within the study area as well as to the north, on the southern flanks of the Shaw Dome, where several nickel deposits exist. The major oxide chemistry of chromites isolated from representative samples of komatiitic rocks from the southern margin of the Shaw Dome is very similar to that depicted by the detrital population (Baird 1999). The chemistry of chromites in this regard will be discussed in greater depth in the section dealing with magmatic Ni-Cu indicator minerals.

### *Chrome Diopside*

The chromium content of chrome diopside has historically been used to distinguish xenocrysts of kimberlitic affinity from those derived from crustal rocks. Dawson and Stephens (1975) suggested a $Cr_2O_3$ cutoff of 1.45 wt % whereby those chrome diopsides with $Cr_2O_3$ contents above this value are likely to be derived from kimberlite. Subsequent studies of chrome diopsides isolated from kimberlite in the Kirkland Lake-Cobalt area of northeastern Ontario have returned $Cr_2O_3$ contents ranging between 0.03 and 3.0 wt % (Sage 1996). A ternary plot of normalized Cr, Al and Na cation data (Figure 11) devised by Morris et al. (2000) discriminates

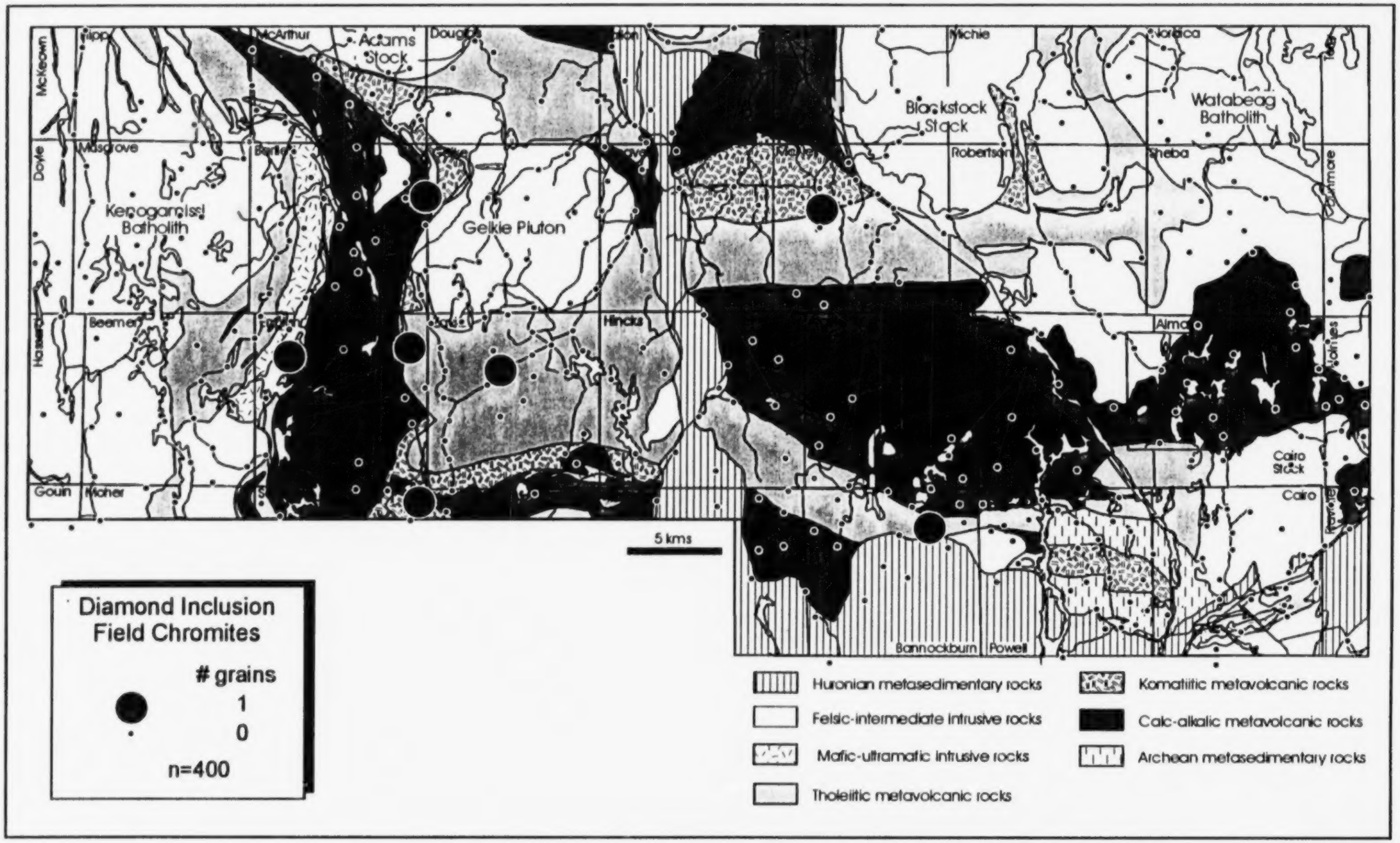
McKeown
Doyle
Hassard
Gouin
Maher
Ripley
Musgrove
Beemer
McArthur
Adams Stock
Douglas
Kenogamissi Batholith
Gelkie Pluton
Hincks
Michie
Blackstock Stack
Robertson
Norica
Watabeag Batholith
Sheba
Alma
Holmes
Dunmore
Cairo Stock
Cairo
Powell
Bannockburn
5 kms
Diamond Inclusion Field Chromites
# grains
1
0
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

**Figure 9.** Regional distribution of diamond inclusion field chromites.

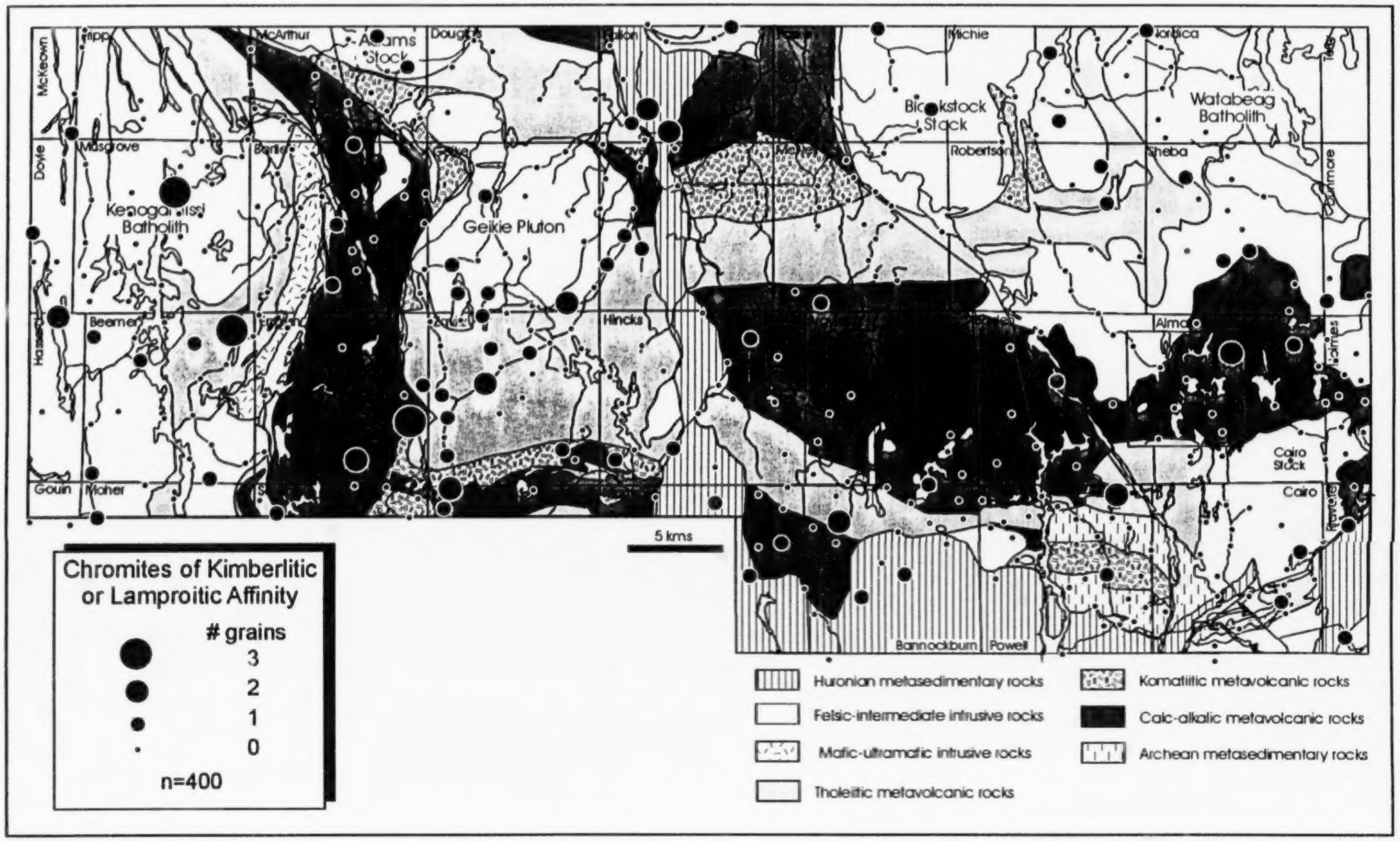
Chromites of Kimberlitic or Lamproitic Affinity
# grains
3
2
1
0
n=400
5 kms
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks
Mckeown
Tripp
McArthur
Adams Stock
Douglas
Michie
Blackstock Stock
Watabeag Batholith
Dowie
Musgrove
Kenogamissi Batholith
Geikie Pluton
Robertson
Sheba
Dunmore
Hassard
Beemer
Hincks
Alma
Holmes
Cairo Stock
Cairo
Gouin
Maher
Bannockburn
Powell

Figure 10. Regional distribution of chromites with kimberlitic or lamproitic affinity.

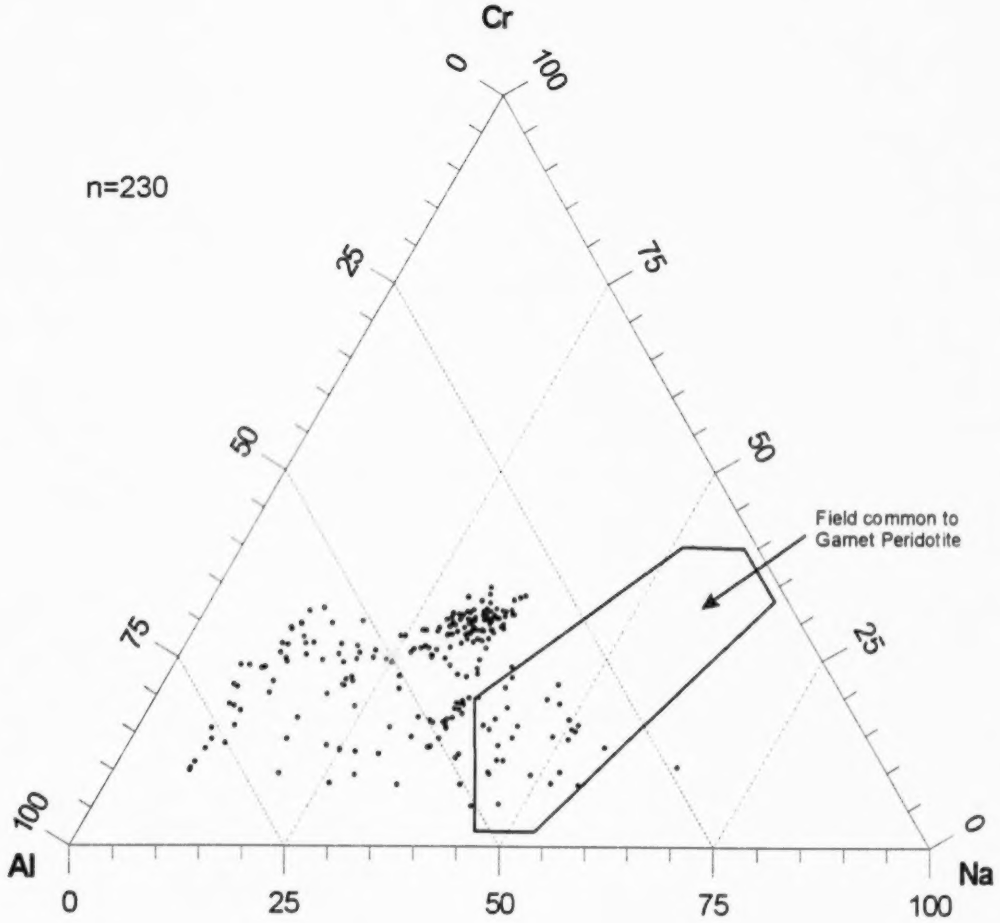

**Figure 11.** Cr-Al-Na ternary plot for chrome diopside (from Morris et al. 2000).

between crustal-derived clinopyroxenes and those originating in the upper mantle within the zone of stability of garnet peridotite. Xenocrystic clinopyroxenes derived from xenolith-bearing alkali basalts associated with continental rift zones also display compositional trends that extend into this field.

Two-hundred and thirty chrome diopside grains were isolated from the heavy mineral concentrates for microprobe analysis. Twenty-nine of these plot within the field common to garnet peridotite. The grains that plot within this field appear to be part of a continuum of compositions extending from a more Al-rich region of the ternary diagram. This may suggest that the chrome diopsides have a source other than garnet peridotite, possibly xenolith-bearing alkali basalts.

Figure 12 presents the regional distribution of chrome diopsides that fall within the garnet peridotite field. Although they occur at low levels, their distribution does not appear to be random. Clusters of samples containing 1 or 2 grains occur in the northeast corner of the study area over the Blackstock Stock and Watabeag Batholith, in the southeastern corner of the study area along the trend of the Larder Lake-Cadillac Break, in the west-central part of the survey area centred over Geikie and Zavitz townships and in the western part of the study area over the Kenogamissi Batholith.

### *Eclogitic and Megacrystic Suite*

#### *Eclogitic Garnets*

Eclogitic garnets, also referred to as pyrope-almandines, occur far less frequently as xenocrysts in kimberlite than do peridotitic garnets. Their occurrence can be quite significant in that Na-enriched varieties occur in diamond eclogites. Diamond-bearing eclogitic xenoliths typically display significantly higher diamond concentrations than do diamond-bearing peridotitic xenoliths (Schultze 1999). As such, the eclogitic xenoliths should be considered extremely important. Garnets recovered from diamond eclogites typically contain greater than 0.07 wt % $Na_2O$ and often contain elevated $TiO_2$ contents. These are referred to as Group I eclogitic garnets (Figure 13). Those with less than 0.07 wt % $Na_2O$ are referred to as Group II eclogites. Although these Group II eclogitic garnets are considered KIMs, they are not associated with diamondiferous eclogites.

A single grain assigned to the Group II eclogitic field of the $Na_2O$-$TiO_2$ binary plot (Figure 13) was recovered from sample site 95-AFB-196. This grain was isolated from a till sample collected in the northeastern part of Zavitz Township.

#### *Cr-poor Pyrope/Megacryst Garnets*

Cr-poor pyrope/megacryst garnets belong to the megacrystic suite and are derived from kimberlitic magma. In spite of being the most predominant orange, mantle-derived garnet in most kimberlites, this suite of garnets has no genetic connection to diamonds (Fipke et al. 1995). Cr-poor megacryst garnets also contain elevated $Na_2O$ and $TiO_2$ contents making them difficult to distinguish from Group I, diamondiferous eclogite garnets. They are, however, easily distinguished on a $TiO_2$-$Na_2O$ diagram where they plot into distinct fields (Figure 13). No Cr-poor pyrope/megacryst garnets were recovered from the regional sampling survey.

#### *Mg-Ilmenites*

Mg-ilmenites form a second species of the megacrystic suite. Ilmenites formed within kimberlitic magma are termed picroilmenites and generally contain between 4 and 15 wt % MgO (McCallum and Vos 1993). If the ilmenite contains greater than 2 wt % $Cr_2O_3$, then there is an even higher probability that the grain was derived from kimberlitic magma. A $Cr_2O_3$-MgO binary plot devised by Gurney and Moore (1991) is useful for the determination of redox

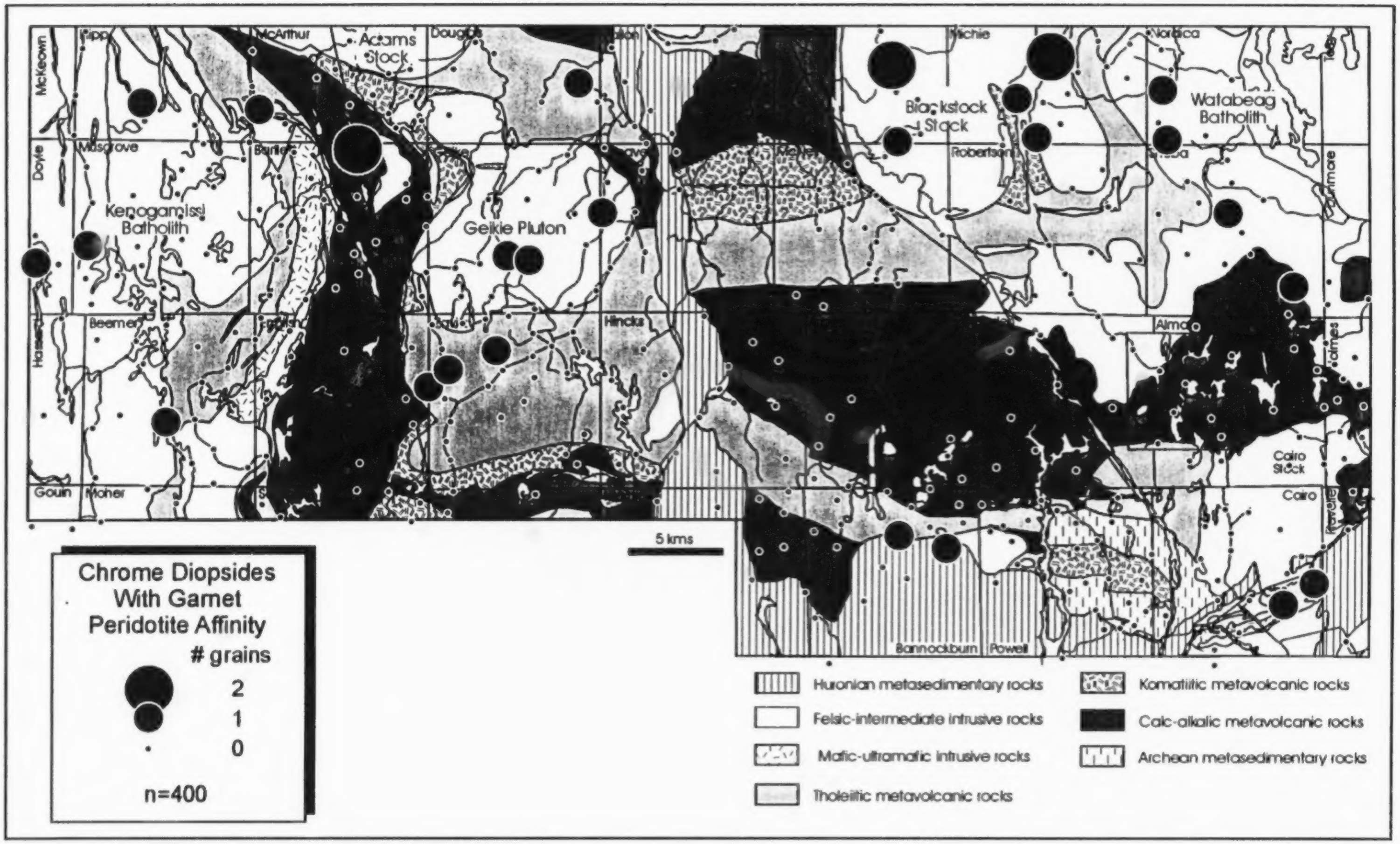
McKeown
Tipp
McArthur
Adams Stock
Douglas
Michie
Norrica
Blackstock Stock
Watabeag Batholith
Robertson
Doyle
Musgrove
Kenogamissi Batholith
Geikie Pluton
Dunmore
Hassard
Beemer
Hincks
Alma
Holmes
Cairo Stock
Cairo
Gouin
Moher
Bannockburn
Powell
Ravelle
5 kms
Chrome Diopsides With Garnet Peridotite Affinity
# grains
2
1
0
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

**Figure 12.** Regional distribution of chrome diopside with garnet peridotite affinity.

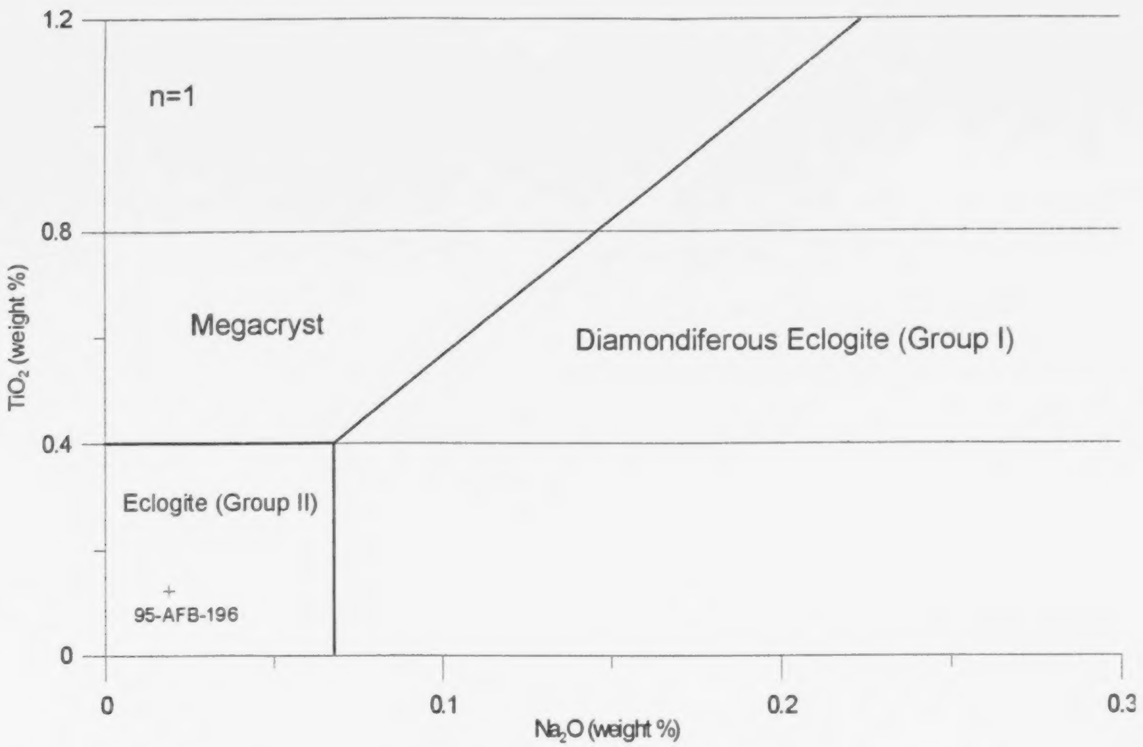

**Figure 13.** $TiO_2$-$Na_2O$ binary plot for eclogite/megacryst garnets (from Schultze 1999).

conditions under which the rising magma was subjected. Magma rising under oxidizing conditions will contain ilmenites with MgO contents of less than approximately 8.0 wt % and will therefore favour diamond resorption. Ilmenites with MgO contents of greater than 8.0 wt % and falling within the reduced field will favour diamond preservation (Figure 14).

Three-hundred and seventy-six picked grains were classified as ilmenites following microprobe analysis at the Ontario Geoscience Laboratories. Many of these grains were initially visually classified as chromites. The results of these analyses are presented on an MgO-$Cr_2O_3$ binary diagram displaying reducing and oxidizing fields for the kimberlite magma (Figure 14). Only 4 grains contain greater than 4 wt.% MgO. The remaining grains are classified as crustal. Of these 4 grains, 2 plot within the reducing or diamond preservation field. The $Cr_2O_3$ content of these grains is much less than 1 wt % suggesting a low probability that they are derived from kimberlitic magma. Sample 95-AFB-228 was recovered from southwestern Nordica Township and sample 95-AFB-288 was recovered from northeastern Robertson Township. The other 2 grains plot within the diamond resorption field and similarly contain low $Cr_2O_3$ contents. These grains were collected from east-central Hincks Township (95-AFB-568) and west-central Zavitz Township (95-AFB-011).

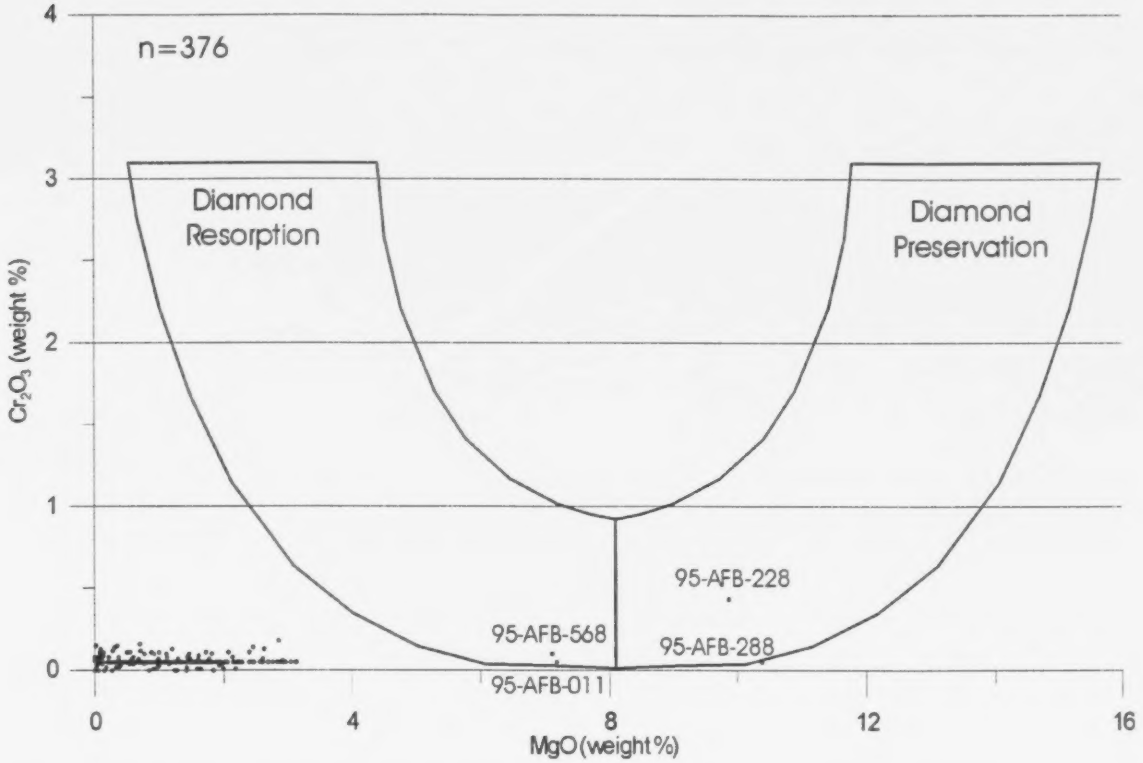

**Figure 14.** $Cr_2O_3$-MgO binary plot for Mg ilmenites (from Gurney and Moore 1991).

***Summary of KIM Results***

One-hundred and forty-two kimberlite indicator minerals were recovered as part of the regional till sampling program. These grains were distributed amongst 113 samples (Table 3). Few samples contained greater than a single KIM grain. In fact, only 23 samples contained greater than a single KIM grain and only 6 samples contained greater than 2 grains. Figure 15 highlights the regional distribution of kimberlite indicator minerals within the study area. Although none of the KIM grain counts approach those normally associated with being proximal to kimberlite source rocks, some interesting spatial patterns have emerged as part of the regional sampling program. The concentration of KIM grains across the study area is not uniform. Clusters of samples containing 1 to 4 grains have been identified. A strong southwesterly oriented anomaly, defined by several indicator mineral species, and extending from southwestern Fallon Township into English and Hutt townships represents one of the strongest of these clusters. As mentioned previously, a strong northeasterly-directed structure coincident with this anomaly has been identified and portrayed on various geological maps of the area. The potential for kimberlite emplacement along this structure should be investigated. Background concentrations of indicator minerals over the southeastern corner of the study area, within an area transected by the western extension of the Larder Lake-Cadillac Break and its splays, are significantly higher than areas immediately to the north. Once again, structural control for kimberlite emplacement should be

**Table 3.** Summary of kimberlite indicator mineral results.

| Sample # | Easting (NAD27) | Northing (NAD27) | G9 Pyrope Garnets | Eclogitic Garnet | Chromite (KIM/Lamp) | Chromite (Incl. Field) | Mg Ilmenites | Chrome Diopside | Total KIMs |
|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4091 | 474200 | 5326850 | 1 |  | 3 |  |  |  | 4 |
| 95-AFB-4113 | 470950 | 5334650 |  |  | 3 |  |  |  | 3 |
| 95-AFB-4224 | 519650 | 5342400 |  |  | 1 |  |  | 2 | 3 |
| 95-AFB-4621 | 484100 | 5321650 |  |  | 3 |  |  |  | 3 |
| 95-AFB-4659 | 481000 | 5337200 |  |  | 1 |  |  | 2 | 3 |
| 96-AFB-4044 | 512895 | 5315920 | 2 |  |  | 1 |  |  | 3 |
| 95-AFB-4005 | 486350 | 5317900 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4011 | 485850 | 5323100 |  |  | 1 |  | 1 |  | 2 |
| 95-AFB-4013 | 484850 | 5323700 |  |  | 1 |  |  | 1 | 2 |
| 95-AFB-4020 | 488250 | 5323800 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4024 | 488600 | 5325750 |  |  | 1 |  |  | 1 | 2 |
| 95-AFB-4031 | 492850 | 5328400 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4045 | 497300 | 5339300 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4055 | 498500 | 5338000 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4250 | 510850 | 5341950 |  |  |  |  |  | 2 | 2 |
| 95-AFB-4287 | 522450 | 5336000 | 1 |  | 1 |  |  |  | 2 |
| 95-AFB-4291 | 529650 | 5325600 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4314 | 481100 | 5319550 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4322 | 464450 | 5327700 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4661 | 523350 | 5317600 |  |  | 2 |  |  |  | 2 |
| 96-AFB-4058 | 532575 | 5311530 |  |  | 1 |  |  | 1 | 2 |
| 96-AFB-4081 | 507975 | 5316030 |  |  | 2 |  |  |  | 2 |
| 95-AFB-4288 | 522775 | 5333950 |  |  | 1 |  | 1 |  | 2 |
| 95-AFB-4004 | 486050 | 5316700 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4006 | 486200 | 5319700 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4008 | 486150 | 5321800 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4018 | 484000 | 5326000 |  |  |  | 1 |  |  | 1 |
| 95-AFB-4021 | 489050 | 5324750 |  |  |  | 1 |  |  | 1 |
| 95-AFB-4027 | 490750 | 5325500 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4033 | 495050 | 5330450 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4035 | 496000 | 5332050 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4037 | 496950 | 5331400 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4046 | 496400 | 5338450 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4071 | 484500 | 5317250 |  |  |  | 1 |  |  | 1 |
| 95-AFB-4077 | 476750 | 5316450 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4081 | 472950 | 5318400 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4119 | 468950 | 5339750 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4127 | 468500 | 5334550 | 1 |  |  |  |  |  | 1 |
| 95-AFB-4135 | 465200 | 5337900 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4139 | 465900 | 5331750 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4142 | 463000 | 5330750 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4143 | 463050 | 5332350 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4151 | 500900 | 5343250 | 1 |  |  |  |  |  | 1 |
| 95-AFB-4152 | 501950 | 5343850 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4153 | 506750 | 5333700 |  |  |  | 1 |  |  | 1 |
| 95-AFB-4171 | 520000 | 5316900 | 1 |  |  |  |  |  | 1 |
| 95-AFB-4195 | 492550 | 5320000 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4196 | 491750 | 5326050 |  | 1 |  |  |  |  | 1 |
| 95-AFB-4201 | 533100 | 5326000 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4204 | 533100 | 5329450 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4215 | 525050 | 5343700 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4227 | 525850 | 5340450 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4228 | 525550 | 5338650 |  |  |  |  | 1 |  | 1 |
| 95-AFB-4229 | 526000 | 5337600 |  |  |  |  |  | 1 | 1 |
| 95-AFB-4231 | 520100 | 5338600 |  |  | 1 |  |  |  | 1 |
| 95-AFB-4232 | 518800 | 5337750 |  |  |  |  |  | 1 | 1 |

**Table 3. (cont'd)** Summary of kimberlite indicator mineral results.

| Sample # | Easting (NAD27) | Northing (NAD27) | G9 Pyrope Garnets | Eclogitic Garnet | Chromite (KIM/Lamp) | Chromite (Incl. Field) | Mg Ilmenites | Chrome Diopside | Total KIMs |
|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4245 | 527200 | 5335400 | | | 1 | | | | 1 |
| 95-AFB-4246 | 529400 | 5333550 | | | | | | 1 | 1 |
| 95-AFB-4248 | 530700 | 5331250 | | | 1 | | | | 1 |
| 95-AFB-4249 | 510100 | 5343800 | | | 1 | | | | 1 |
| 95-AFB-4253 | 513100 | 5339200 | | | 1 | | | | 1 |
| 95-AFB-4255 | 511050 | 5337550 | | | | | | 1 | 1 |
| 95-AFB-4268 | 488100 | 5327575 | | | 1 | | | | 1 |
| 95-AFB-4270 | 486700 | 5328850 | | | 1 | | | | 1 |
| 95-AFB-4271 | 488450 | 5328900 | | | 1 | | | | 1 |
| 95-AFB-4273 | 520000 | 5323900 | | | 1 | | | | 1 |
| 95-AFB-4274 | 470150 | 5329400 | 1 | | | | | | 1 |
| 95-AFB-4283 | 529250 | 5330750 | | | 1 | | | | 1 |
| 95-AFB-4286 | 517650 | 5339950 | | | | | | 1 | 1 |
| 95-AFB-4298 | 506950 | 5328350 | | | 1 | | | | 1 |
| 95-AFB-4301 | 501100 | 5317050 | | | 1 | | | | 1 |
| 95-AFB-4308 | 493041 | 5333549 | 1 | | | | | | 1 |
| 95-AFB-4312 | 479750 | 5329400 | | | 1 | | | | 1 |
| 95-AFB-4320 | 472100 | 5326050 | | | 1 | | | | 1 |
| 95-AFB-4321 | 466479 | 5326462 | | | 1 | | | | 1 |
| 95-AFB-4501 | 485950 | 5324650 | | | | | | 1 | 1 |
| 95-AFB-4508 | 486400 | 5330450 | | | 1 | | | | 1 |
| 95-AFB-4511 | 489300 | 5331100 | | | | | | 1 | 1 |
| 95-AFB-4513 | 490400 | 5330900 | | | | | | 1 | 1 |
| 95-AFB-4515 | 488250 | 5334350 | | | 1 | | | | 1 |
| 95-AFB-4528 | 494550 | 5333600 | | | | | | 1 | 1 |
| 95-AFB-4533 | 493300 | 5340750 | | | | | | 1 | 1 |
| 95-AFB-4540 | 480000 | 5332750 | | | 1 | | | | 1 |
| 95-AFB-4545 | 475400 | 5339300 | | | | | | 1 | 1 |
| 95-AFB-4551 | 482250 | 5343400 | | | 1 | | | | 1 |
| 95-AFB-4566 | 498750 | 5320050 | | | 1 | | | | 1 |
| 95-AFB-4568 | 501950 | 5322900 | | | | | 1 | | 1 |
| 95-AFB-4582 | 503000 | 5326350 | | | 1 | | | | 1 |
| 95-AFB-4592 | 536950 | 5322800 | 1 | | | | | | 1 |
| 95-AFB-4598 | 536150 | 5315850 | | | 1 | | | | 1 |
| 95-AFB-4616 | 534950 | 5328450 | | | 1 | | | | 1 |
| 95-AFB-4623 | 477250 | 5325500 | | | | 1 | | | 1 |
| 95-AFB-4639 | 484900 | 5334500 | | | | 1 | | | 1 |
| 95-AFB-4645 | 466750 | 5316200 | | | 1 | | | | 1 |
| 95-AFB-4646 | 466400 | 5318750 | | | 1 | | | | 1 |
| 95-AFB-4653 | 470300 | 5321800 | | | | | | 1 | 1 |
| 95-AFB-4654 | 469000 | 5325150 | | | 1 | | | | 1 |
| 95-AFB-4657 | 483950 | 5341600 | | | 1 | | | | 1 |
| 95-AFB-4662 | 512950 | 5318050 | | | 1 | | | | 1 |
| 95-AFB-4663 | 495550 | 5319400 | | | 1 | | | | 1 |
| 96-AFB-4009 | 522840 | 5313025 | | | 1 | | | | 1 |
| 96-AFB-4048 | 522105 | 5311295 | 1 | | | | | | 1 |
| 96-AFB-4054 | 533550 | 5314300 | | | 1 | | | | 1 |
| 96-AFB-4057 | 532600 | 5312450 | 1 | | | | | | 1 |
| 96-AFB-4066 | 529695 | 5314600 | 1 | | | | | | 1 |
| 96-AFB-4070 | 536090 | 5309520 | | | 1 | | | | 1 |
| 96-AFB-4101 | 502960 | 5312930 | | | 1 | | | | 1 |
| 96-AFB-4102 | 504765 | 5314755 | | | 1 | | | | 1 |
| 96-AFB-4104 | 509250 | 5311780 | | | 1 | | | | 1 |
| 96-AFB-4106 | 511615 | 5313030 | | | 1 | | | | 1 |
| 96-AFB-4107 | 511140 | 5315425 | | | | | | 1 | 1 |
| 96-AFB-4110 | 513850 | 5314705 | | | | | | 1 | 1 |
| 96-AFB-4124 | 534300 | 5312755 | | | | | | 1 | 1 |

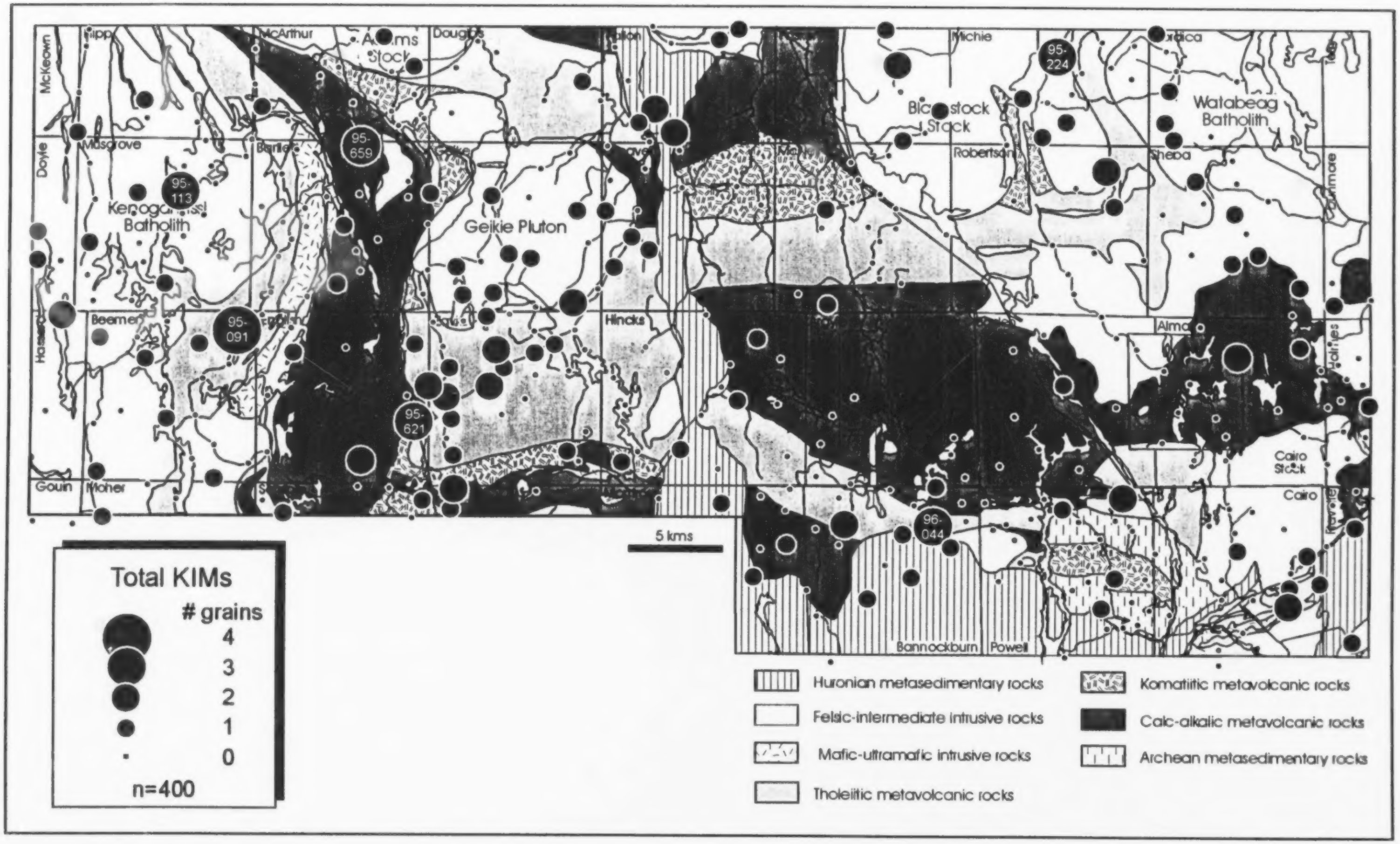
Mckeown
Tripp
McArthur
Adams Stock
Douglas
Dalton
Michie
95-224
Bicestock Stack
Robertson
Cordica
Watabeag Batholith
Sheba
Dunmore
Doyle
Musgrove
Bartlett
95-659
Geikie
95-113
Kenogamissi Batholith
Geikie Pluton
Hincks
Hassard
Beemer
95-091
Eldorado
Almo
Holmes
95-621
Cairo Stock
Cairo
Gouin
Moher
Bannockburn
Powell
96-044
Rankin
5 kms
Total KIMs
# grains
4
3
2
1
0
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

**Figure 15.** Regional distribution of kimberlite indicator minerals.

investigated within this region. Isolated occurrences of KIMs over the northeastern corner and extreme western end of the study area should be investigated as well to determine their significance. The reader is reminded that the dataset presented herein is derived exclusively from till. Bearing this in mind, it should be noted that a relatively local signal of diamond potential is achieved using this medium. Stream and esker sampling programs should be conducted as well within this area to more fully evaluate the region and possibly confirm regional patterns depicted by the till dataset.

## Metamorphic/Magmatic Massive Sulphide Indicator Minerals (MMSIMs®*)

As mentioned previously, the suite of indicator minerals picked as part of the MMSIM® package target 3 main styles of mineralization, namely: 1) those associated with high grade metamorphism of volcanosedimentary massive sulphide deposits and their alteration halos; 2) those associated with thermal metamorphism and metasomatism as occur in skarns and greisens; and 3) those associated with magmatic Ni-Cu-PGE mineralization.

Base metal indicator minerals of greatest interest to this study are likely those associated with Ni-Cu-PGE sulphide mineralization. The study area is host to a past-producer of Ni-Cu-PGEs (Texmont Mine) and also contains abundant mafic to ultramafic host rocks favourable for this type of mineralization. Greenschist metamorphism predominates within this portion of the Abitibi Greenstone Belt. Amphibolite facies contact aureoles occur locally around the perimeters of several late- to post-tectonic felsic intrusions such as the Kenogamissi and Watabeag batholiths (Jackson and Fyon 1991). The metamorphic grade of the belt is therefore, on average, probably not at a high enough level for the generation of high-grade mineral assemblages associated with volcanosedimentary massive sulphide deposists and their alteration halos. Volcanogenic massive sulphide mineralization is, therefore, best indicated by the presence of ore-forming sulphide minerals such as chalcopyrite, sphalerite and galena as well as native gold. Most hydrothermal alteration zones in greenschist facies terranes are characterized by fine-grained, low-density minerals that are not detected by the MMSIM® method (Averill 1999). Mineralization associated with thermal metamorphism and metasomatism may be of local importance.

Ore-forming indicator minerals associated with magmatic Ni-Cu-PGE mineralization include chalcopyrite, chromite, sperrylite ($PtAs_2$), as well as a number of PGE alloys. Pyrrhotite and pentlandite are infrequently encountered. Most of the other indicator minerals associated with this type of mineralization form during the hybridization process during which Ni and Cu are separated from the silicate phase of a mafic-ultramafic magma. For example, the removal of large volumes of Fe from the silicate phase of a magma during the formation of Ni-Cu sulphides tends to result in the formation of Mg-rich olivines (forsterite) and Mg-rich orthopyroxenes (bronzite/enstatite). Chromium may also transfer from chromite to Fe-free minerals such as rutile, diopside and uvarovite; a garnet often associated with chromite-bearing serpentinites. If sufficient Fe is removed from the silicate melt so as to inhibit the formation of chromite, then gahnite, a zincian-spinel may form and the excess Cr accommodated by chrome diopside.

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*MMSIM is a registered trademark of Overburden Drilling Management Limited, Nepean, Ontario

### *Chromite*

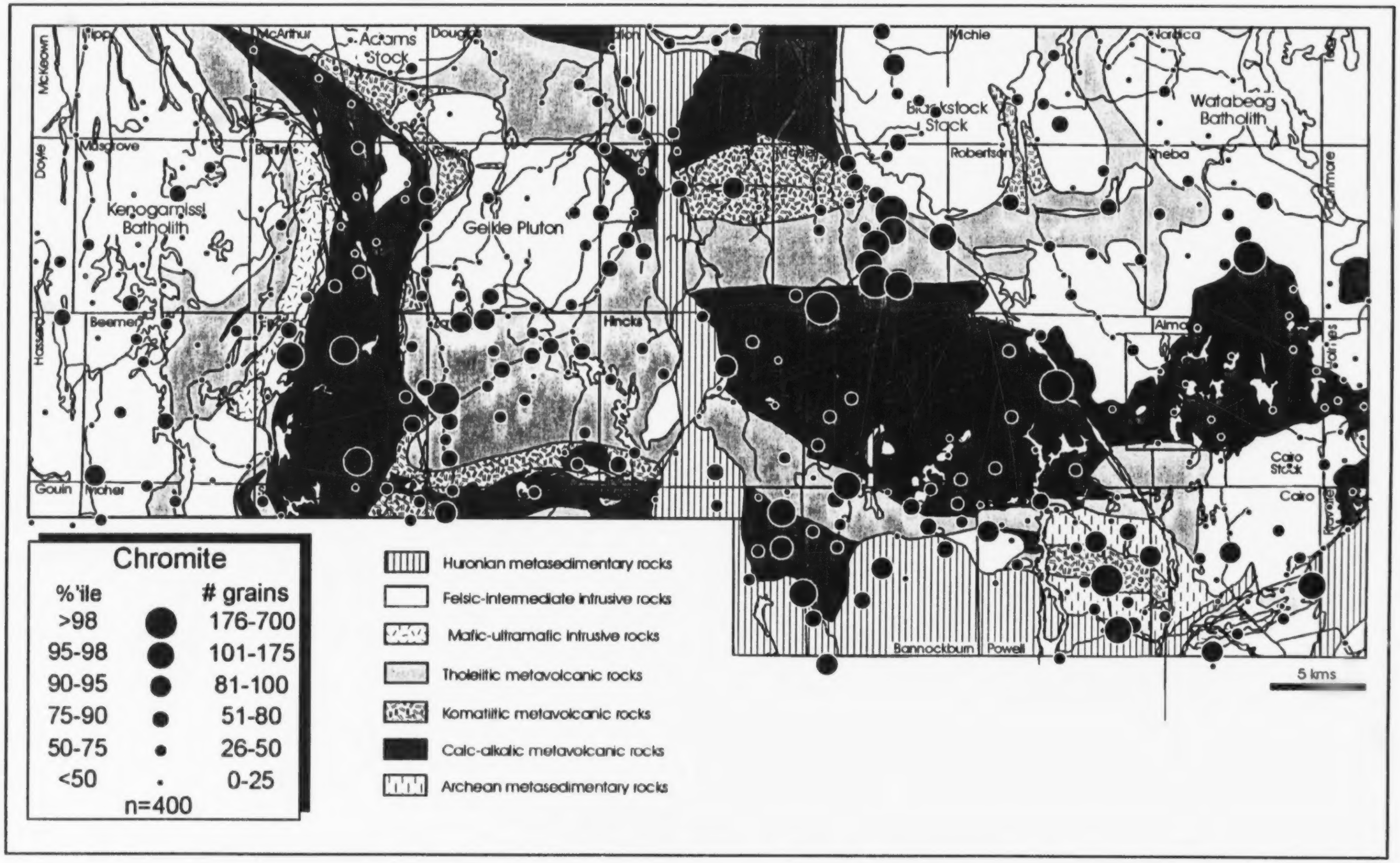
Chromite is an important constituent of mafic and ultramafic rocks. It occurs most notably within peridotite, komatiite and their serpentinized counterparts. It forms during the early stages of magma crystallization and may therefore accumulate as distinct horizons within the magma chamber as a result of crystal sorting and settling. Such layered intrusions are prime hosts for Ni-Cu sulphide mineralization. Chromite may also accumulate at the base of channelized, komatiitic flows in association with Ni sulphide mineralization. The regional distribution of chromite in till may therefore provide valuable information on the location of potentially fertile mafic-ultramafic host rocks. These anomalies are further enhanced by the occurrence of additional indicator minerals such as chalcopyrite, platinum group minerals, most notably the arsenides, chrome diopside and Cr-rich rutile.

Chromite grains occur at elevated concentrations throughout the study area (Figure 16). In fact, chromite grains have been identified in 394 of the 400 heavy mineral concentrates processed for indicator minerals. Levels are highest over Archean supracrustal terrane and diminish over plutonic terrane. Elevated chromite grain counts over plutonic terrane generally signify proximal mafic-ultramafic source rocks. For example, elevated chromite grain counts in Fasken Township over the Blackstock Stock are probably a result of southeasterly dispersal of ultramafic lithologies from the southern flanks of the Shaw Dome. Elevated chromite grain counts in Musgrove and Beemer townships, over the Kenogamissi Batholith, are interesting in that no significant sources of ultramafic rock have been identified within this region. Narrow slivers of peridotite and pyroxenite do occur, however, to the north in Fripp Township and may have served as the source rocks for the chromites.

Three areas of elevated chromite concentrations occur over supracrustal terrane within the study area. These include: 1) a broad southwest-trending zone extending from north-central Fallon Township to northeastern Semple Township; 2) a discrete cluster of anomalous samples centred over McNeil Township; and 3) a broad east-trending zone extending from eastern Montrose Township, through Powell and into Cairo Township.

The area of elevated background extending from Fallon to Semple townships is likely a composite signature of both short and long-distance glacial dispersal. The northern half of this anomaly, which is centred over Fallon and Cleaver townships, is probably caused by the southwesterly dispersal of ultramafic lithologies from the southern margin of the Shaw Dome. High concentrations of chromites over Zavitz, English and northern Semple and Hutt townships are likely related to the local dispersal of serpentinized and spinifex-textured peridotites that have been mapped within this region. The anomalous grain counts in northwestern English Township are probably related to the local dispersal of gabbroic host rocks.

Probably the most significant chromite anomaly recognized as part of this survey is centred over McNeil Township. Eight samples within this anomaly contain in excess of 100 chromite grains and sample site 95-AFB-298, which is situated in southwestern McNeil Township,



McKeown
Tipp
McArthur
Adams Stock
Douglas
Michie
Blackstock Stack
Nordica
Watabeag Batholith
Teefy
Doyle
Musgrove
Bartlett
Robertson
Sheba
Guibord
Kenogamissi Batholith
Geikie Pluton
Hassard
Beemer
Hincks
Alma
Gouin
Fisher
Cairo Stock
Cairo
Bannockburn
Powell
Ravelle
5 kms
Chromite
%'ile
# grains
>98
176-700
95-98
101-175
90-95
81-100
75-90
51-80
50-75
26-50
<50
0-25
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

Figure 16. Regional distribution of chromite in till.

contained an estimated 700 chromite grains. Few samples were collected from adjoining townships to adequately determine the true extent of this anomaly. Concentrations of chromite grains do, however, appear to decline to regional background levels to the east, south and northwest. Felsic-intermediate intrusive rocks lie immediately northeast of this anomaly and constrain the position of possible source rocks to the southeastern corner of McNeil Township. A significant sequence of magnesium-rich tholeiitic basalts, that includes komatiite, extends easterly from Cleaver Township into McNeil and Robertson townships. These rocks are the likely source of the high chromite population and should be investigated for their Ni-Cu-PGE potential.

The broad, east-trending zone of anomalous chromite grain counts extending from Montrose to Cairo townships, at the southeastern corner of the survey area, is clearly a signature of local ultramafic source rocks. Background chromite grain counts diminish abruptly to the north over calc-alkalic metavolcanic terrane. Chromite grain counts within this area of elevated background commonly exceed 80 grains and in several instances exceed 100 grains. Regional-scale, west-trending faults, believed to represent the western extension of the Larder Lake-Cadillac Break, transect this region and divide the area into lithologically distinct fault blocks. The Archean succession consists primarily of alternating fault blocks of north-facing Fe- and Mg-rich tholeiitic basalts and calc-alkalic volcanic rocks including volcaniclastic and turbiditic sediments and komatiitic flows. Shear zones separating the fault blocks contain distinctive, schistose, sedimentary units containing a mixture of carbonatized komatiitic and calc-alkalic volcanic detritus. The komatiitic flows and metasedimentary rocks of ultramafic affinity are the likely sources for the chromites present within this region. The potential for discoveries of Ni-Cu sulphide mineralization within these units is considered high and supported by the recent discovery of several ultramafic-hosted Ni-Cu sulphide zones in west-central Bannockburn Township by Outokumpo Mines Limited.

Isolated occurrences of anomalous chromite grain counts occur throughout the remaining portions of the study area. Notable anomalies include a discrete anomaly in central Sheba Township near the contact between supracrustal rocks and the Watabeag Batholith and a single sample anomaly in central Baden Township. The significance of these anomalies should be investigated by prospecting and follow-up till sampling.

In an attempt to determine whether komatiite is in fact the likely source rock of chromites within the study area, a comparison of published chromite geochemistry from the southern flanks of the Shaw Dome to that of detrital chromites recovered from the survey area was undertaken. Several binary plots of geochemistry were used for comparison and 2 are presented in Figure 17. A useful method of comparing spinel compositions is to plot Cr/(Cr+Al) and $Fe^{3+}/(Fe^{3+} + Al + Cr)$ versus $Fe^{2+}/(Fe^{2+} + Mg)$. Strong compositional overlap occurs between the Shaw Dome chromites and detrital chromites recovered from the survey area. Several distinct geochemical populations highlighted by dotted lines in Figure 17 are recognized in the detrital dataset. Two occur within the overlap field. Chromites belonging to an $Fe^{2+}$-poor population (P1) are widely distributed, although, slightly concentrated on both the eastern and western margins of the survey area where batholithic complexes dominate. They generally account for greater than 37% of the

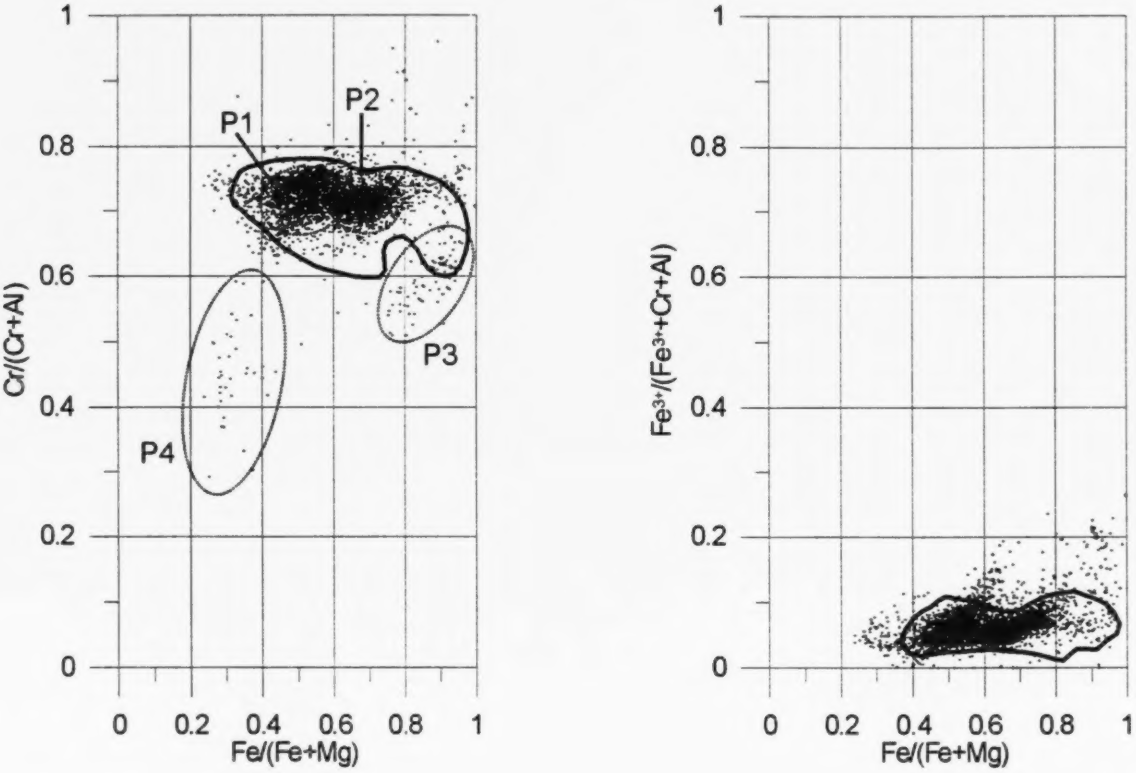


**Figure 17.** Binary plots of geochemistry for representative chromite grains picked as part of the heavy mineral processing. Solid line indicates field of composition of chromites isolated from ultramafic rocks (komatiites and komatiitic peridotites) on the southern flanks of the Shaw Dome (from Baird 1999). Multiple populations depicted by fine dotted ellipses.

total chromites at any given site. An Fe$^{2+}$-rich population (P2) is restricted primarily to the central portion of the survey area where komatiitic source rocks and their associated dispersal trains exist. This population usually accounts for greater than 32% of the total chromites at any given site within this region. A Cr$^{+3}$-poor, Fe$^{2+}$-rich population (P3) is restricted almost exclusively to the extreme eastern end of the survey area. Finally, a Cr$^{+3}$-poor, Fe$^{2+}$-poor population (P4) occurs most frequently within the central part of the survey area south and southwest of the Shaw Dome komatiites. Assessing the significance of these multiple populations is planned as part of continuing studies at the Ontario Geological Survey.

Chromites derived from komatiites on the southern flank of the Shaw Dome display distinct compositional trends based on the metamorphic grade of the host rocks from which they were isolated (Figure 18). Assuming that most of the survey chromites are derived from komatiite, it would appear that a high proportion are sourced from rocks subjected to greenschist facies metamorphism. This observation is consistent with our present knowledge of metamorphic

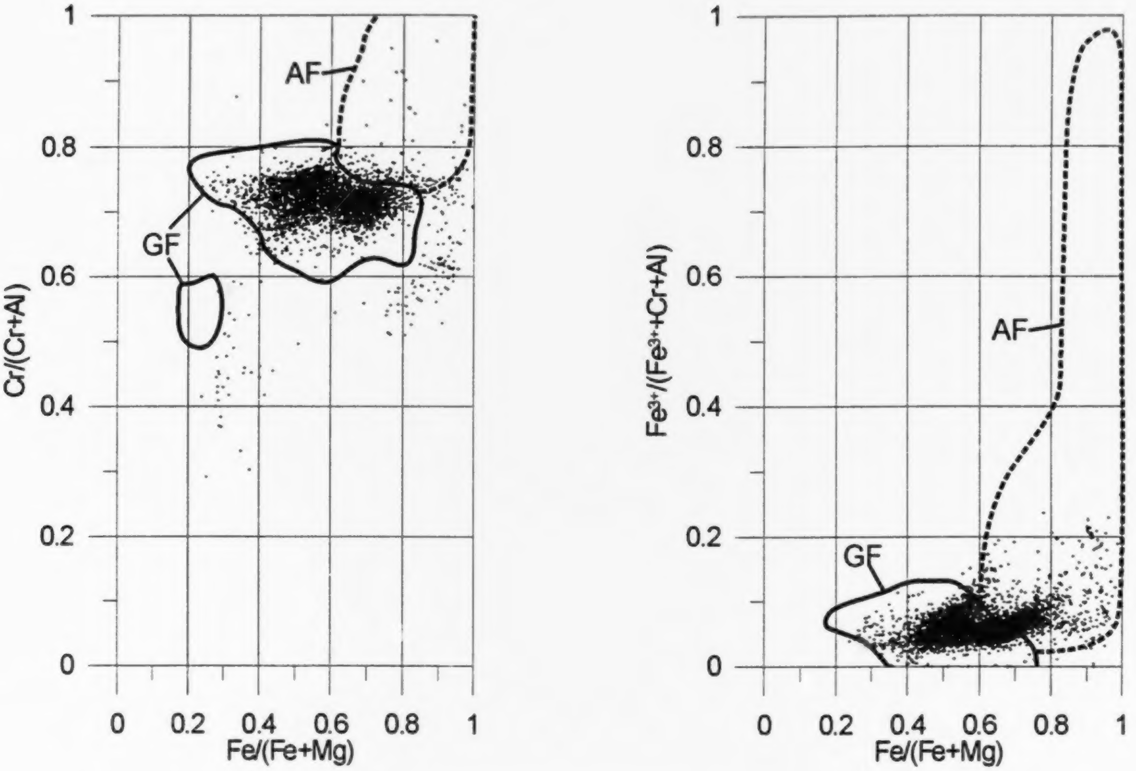


**Figure 18.** Binary plots of geochemistry for representative chromite grains picked as part of the heavy mineral processing. Solid line indicates field of composition of chromites isolated from ultramafic rocks of greenschist facies (GF) metamorphism on the southern flanks of the Shaw Dome. Dashed line indicates field of amphibolite facies (AF) metamorphism (from Baird 1999).

grade within this portion of the belt. The detrital chromites also display a distinct compositional trend similar to that depicted by chromites derived from stratiform intrusions (Figure 19). A small fraction of the detrital chromites have compositional trends consistent with Alpine-type peridotites.

Chromites isolated from mineralized and nonmineralized komatiitic rocks north of the study area display unique MnO and ZnO contents (Baird 1999). Chromites isolated from mineralized komatiites at the Galata and Redstone nickel deposits generally contain greater than 1.0 wt % ZnO and greater than 2.0 wt % MnO (Baird 1999). Groves et al. (1977, 1983) and Papunen et al. (1979) have reported similar zinc enrichment based on their research in Western Australia and Lapland, respectively. Bavinton (1981) and Parker (1984) have attributed the high zinc content of chromites at Kambalda to the assimilation of zinc-rich interflow sediments by thermal erosion. Barnes (2000) has recently suggested that zinc is introduced during low-temperature alteration with further concentration and homogenization during prograde metamorphism. In the Shaw Dome area, footwall rocks underlying komatiitic sequences are zinc-poor and therefore were

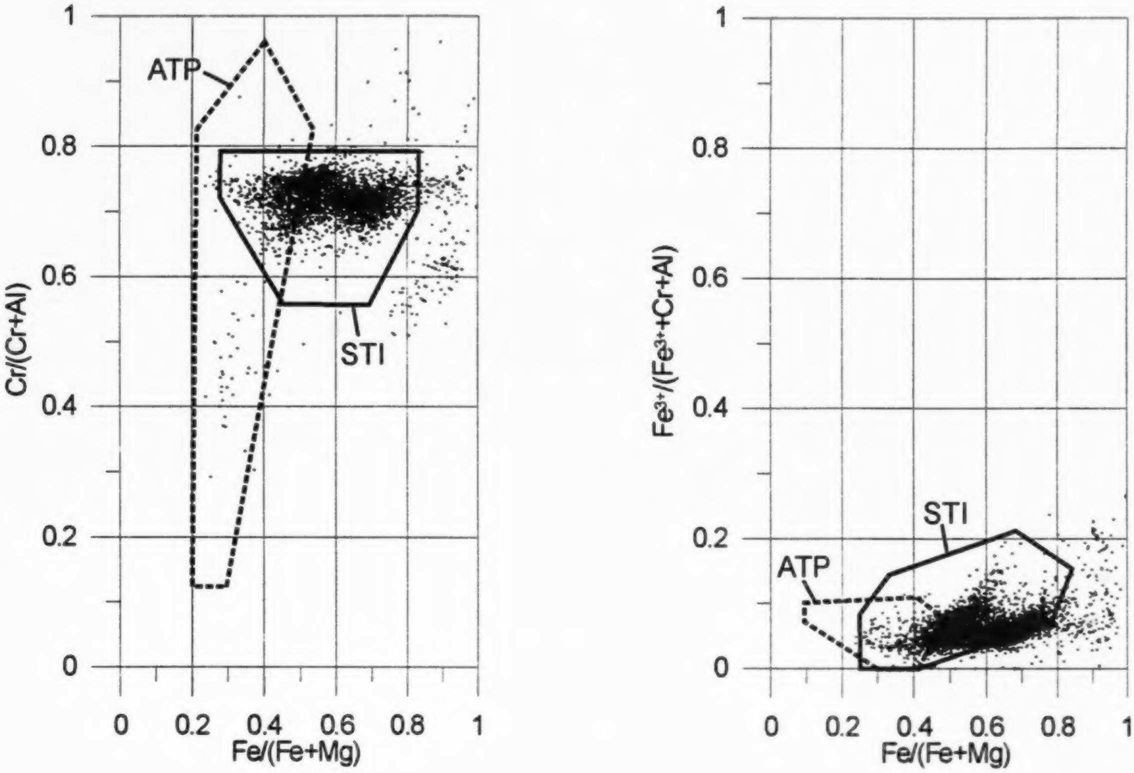


**Figure 19.** Binary plots of geochemistry for representative chromite grains picked as part of the heavy mineral processing. Solid line indicates field of composition of chromites isolated from stratiform-type intrusions (STI). Dashed line indicates field of composition for Alpine-type peridotites (ATP) (from Dick and Bullen (1984) and Jan and Windley (1990)).

probably not an important source of zinc in komatiitic chromites. Zinc and manganese concentrate on the margins of chromite cores, just inside the magnetite rims, magnetite being an alteration product resulting from serpentinization. Zinc-enriched chromites are also restricted to those grains containing greater than 28 wt % FeO; an indication that the grains have been highly altered.

Fifteen detrital chromite grains isolated as part of this survey contain in excess of 1.0 wt % ZnO and 7 also contain greater than 2.0 wt % MnO. Most of these grains contain greater than 28 wt % FeO indicating that they are derived from metamorphosed, highly altered source rocks. These samples are listed in Table 4 and their spatial distribution is shown in Figure 20. A clustering of grains with greater than 1.0 wt % ZnO and/or greater than 2.0 wt % MnO occurs in Zavitz and adjoining Hutt township where ultramafic rocks of komatiitic affinity have been recognized. A couple of chromites recovered from central Sheba Township and southwestern Musgrove Township also returned ZnO contents in excess of 1.0 wt %. The significance of these

**Table 4.** Listing of detrital chromite grains containing either greater than 1.0 wt % ZnO or 2.0 wt % MnO.

| Sample # | Easting (NAD27) | Northing (NAD27) | MnO wt.% | ZnO wt.% | FeO wt.% |
|---|---|---|---|---|---|
| 95-AFB-4004 | 486050 | 5316700 | 0.69 | 1.09 | 31.03 |
| 95-AFB-4006 | 486200 | 5319700 | 0.53 | 1.54 | 27.88 |
| 95-AFB-4006 | 486200 | 5319700 | 0.75 | 1.32 | 29.63 |
| 95-AFB-4011 | 485850 | 5323100 | 2.48 | 2.44 | 28.63 |
| 95-AFB-4011 | 485850 | 5323100 | 2.48 | 2.44 | 28.63 |
| 95-AFB-4047 | 490750 | 5326800 | 2.35 | 3.69 | 27.83 |
| 95-AFB-4047 | 490750 | 5326800 | 2.35 | 3.69 | 27.83 |
| 95-AFB-4130 | 468950 | 5330650 | 0.61 | 1.23 | 31.79 |
| 95-AFB-4139 | 465900 | 5331750 | 1.75 | 1.83 | 29.45 |
| 95-AFB-4176 | 529100 | 5319700 | 1.86 | 3.02 | 27.82 |
| 95-AFB-4192 | 519500 | 5331750 | 0.64 | 1.63 | 37.71 |
| 95-AFB-4211 | 492700 | 5324550 | 3.01 | 0.14 | 26.61 |
| 95-AFB-4246 | 530250 | 5332450 | 1.07 | 1.93 | 29.97 |
| 95-AFB-4283 | 529250 | 5330750 | 0.74 | 1.18 | 30.29 |
| 95-AFB-4297 | 517300 | 5325800 | 2.28 | 0.44 | 27.52 |
| 95-AFB-4502 | 485700 | 5325950 | 2.01 | 1.82 | 29.02 |
| 95-AFB-4502 | 485700 | 5325950 | 2.01 | 1.82 | 29.02 |
| 95-AFB-4528 | 494550 | 5333600 | 0.23 | 1.50 | 30.27 |
| 95-AFB-4570 | 507300 | 5322100 | 2.43 | 0.30 | 25.44 |
| 95-AFB-4637 | 501150 | 5323650 | 0.10 | 1.26 | 31.47 |
| 95-AFB-4638 | 483660 | 5334300 | 0.48 | 1.55 | 30.14 |
| 96-AFB-4106 | 511615 | 5313030 | 2.54 | 0.14 | 29.64 |

is not known as they are not associated with mapped ultramafic units. A number of single occurrences of high zinc and manganese chromites are randomly distributed throughout the remaining portions of the study area and most likely represent a background population. The cluster of anomalous samples in Zavitz Township may indicate the presence of mineralized komatiitic host rocks. Alternatively, they may indicate the presence of highly altered and metamorphosed komatiites on the outer margins of the Geikie Pluton.

### *Chrome Diopside*

Cr-bearing diopside is an important constituent of pyroxenitic and peridotitic horizons associated with a number of Ni deposits, including those at Outokumpo, Finland and the Thompson Nickel Belt in northern Manitoba (Averill 1999). Its occurrence within the study area may indicate areas of favourable host rocks for Ni-Cu-PGE mineralization. Chrome diopside occurs in over 60% of samples processed for indicator minerals (Figure 21). Regional background approximates 0 to 2 grains per site. Elevated background grain counts occur most notably over: 1) the northeastern corner of the study area in Michie, Nordica and Sheba townships; 2) in McArthur and Bartlett townships; and 3) in the west-central part of the study area over felsic intrusive rocks of the Kenogamissi Batholith.

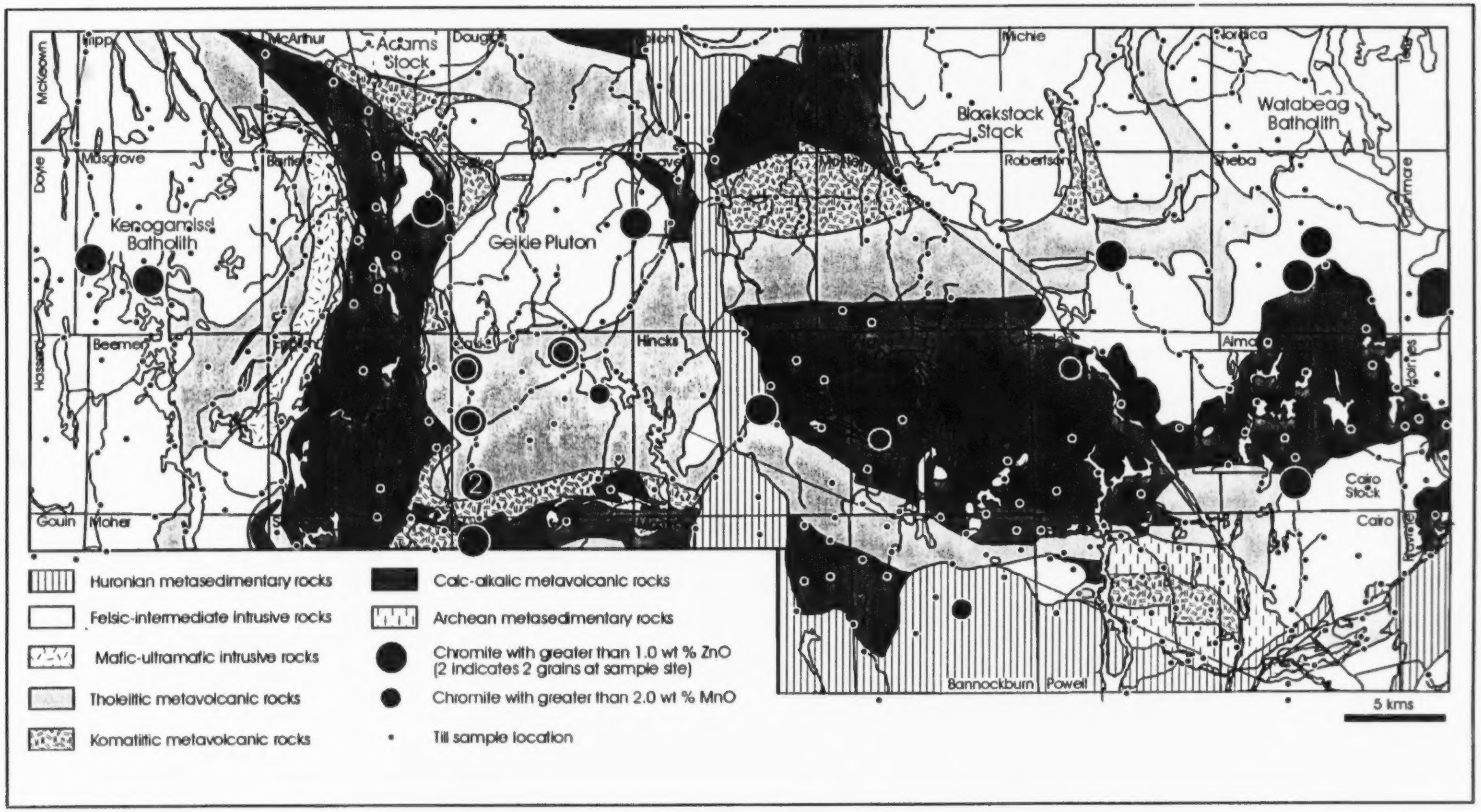

McKeown
Tripp
McArthur
Adams Stock
Douglas
Michie
Nordica
Blackstock Stack
Watabeag Batholith
Doyle
Musgrove
Bartlett
Robertson
Sheba
Dunmore
Kenogamissi Batholith
Geikie Pluton
Hassard
Beemer
Hincks
Alma
Holmes
Cairo Stock
Gouin
Moher
Cairo
Bannockburn
Powell
Flavelle
2
5 kms
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks
Chromite with greater than 1.0 wt % ZnO (2 indicates 2 grains at sample site)
Chromite with greater than 2.0 wt % MnO
Till sample location

**Figure 20.** Regional distribution of chromite grains with greater than 1.0 wt % ZnO and/or greater than 2.0 wt % MnO.

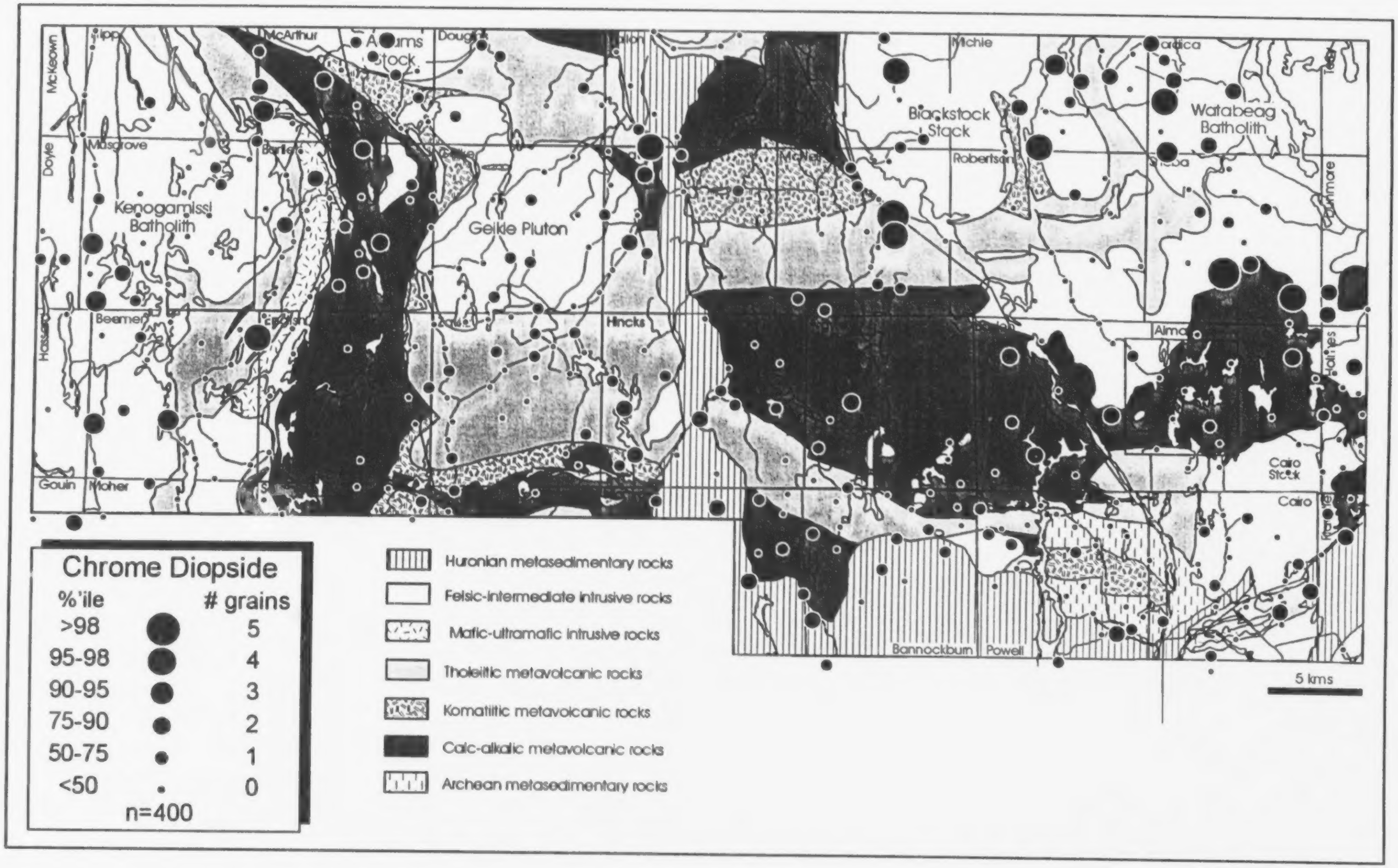

Chrome Diopside
%'ile
# grains
>98
5
95-98
4
90-95
3
75-90
2
50-75
1
<50
0
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks
5 kms
Kenogamissi Batholith
Geikie Pluton
Adams Stock
Blackstock Stack
Watabeag Batholith
Cairo Stock
Mckeown
Doyle
Hassard
Gouin
Moher
Musgrove
Beemer
McArthur
Douglas
Michie
Robertson
Hincks
Alma
Holmes
Dunmore
Cairo
Bannockburn
Powell

Figure 21. Regional distribution of chrome diopside in till.

Anomalous grain counts over the northeastern corner of the study area may be, in part, a response to a recently discovered mafic-ultramafic intrusion, informally referred to as the "Band-Ore intrusion". The intrusion, which is located in north-central Nordica Township, consists primarily of gabbro and pegmatitic anorthositic gabbro locally cut by anorthosite (Vaillancourt 1999). A sulphidic ultramafic cumulate consisting of olivine, pyroxene and magnetite as well as a chromitite unit enriched in PGEs have been recognized within the intrusion. Anomalous chromite grain counts coincident with the southern part of this area of elevated background (south-central Sheba Township) suggest the presence of an, as yet undiscovered, mafic-ultramafic unit. A magnetic high coincident with this anomaly in southeastern Sheba Township supports this interpretation.

The elevated grain counts in Bartlett and McArthur townships are probably attributed to the presence of abundant ultramafic rocks consisting of spinifex textured flows and polysutured and serpentinized peridotites (Pyke 1978b). Elevated grain counts over the Kenogamissi Batholith are difficult to interpret. Neither till nor lake sediment geochemical anomalies have been recognized within this area in support of this anomaly.

Anomalous chrome diopside grain counts in east-central McNeil Township complement a strong chromite anomaly discussed in the previous section. The chrome diopside anomaly is, however, more restricted in size and defined by only 2 sample sites. Prospecting and higher density till sampling is recommended within this area to more fully evaluate the significance of the anomaly, identify possible host rocks and refine the exploration target.

Anomalous grain counts in northwestern Cleaver Township occur at the contact between tholeiitic and calc-alkalic metavolcanic rocks. Ultramafic rocks have not been recognized within this area, however, a southeast-trending magnetic high, originating in southeast Douglas Township and extending into southwest Fallon Township, may represent the source of this anomaly.

### *Olivine*

Olivine occurs primarily in igneous rocks rich in ferromagnesian minerals. Common host rocks include gabbro, peridotite and komatiite. The occurrence of olivine in till may point to host rocks of mafic to ultramafic affinity and, in so doing, may lead to areas favourable for magmatic Ni-Cu-PGE mineralization. Background concentrations of olivine over the western half of the study area are much higher than over the eastern half (Figure 22). This is attributed to the fact that ultramafic rocks are concentrated within this region. Background levels over the eastern half generally occur at levels of less than 2 to 3%. Slightly elevated background occurs in central McNeil Township where elevated to anomalous concentrations of chromite and chrome diopside were observed. Similarly elevated background also occurs in Montrose, Bannockburn, Powell and Cairo townships where regionally elevated background concentrations of chromite occur.

Background concentrations of olivine over the western half of the study area are significantly higher yielding grain counts consistently greater than 3% of the non-magnetic heavy mineral

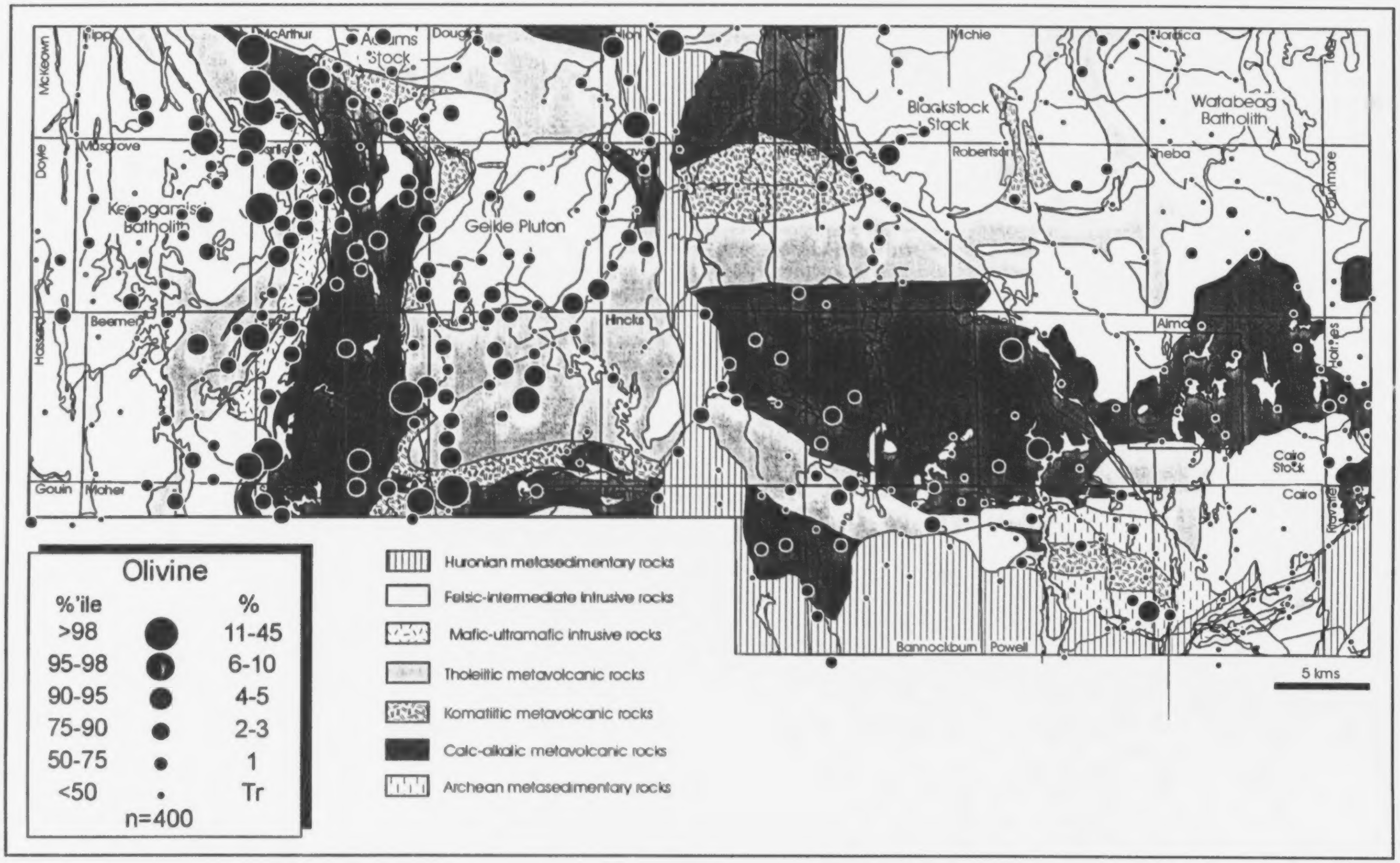

McKeown
Doyle
Hassard
Gouin
Maher
Beemer
Musgrove
McArthur
Adams Stock
Dougherty
Kenogamissi Batholith
Geikie Pluton
Hincks
Michie
Blackstock Stack
Robertson
Watabeag Batholith
Sheba
Alma
Cairo Stock
Cairo
Holmes
Dunmore
Bannockburn
Powell
5 kms
Olivine
%'ile
%
>98
11-45
95-98
6-10
90-95
4-5
75-90
2-3
50-75
1
<50
Tr
n=400
Huronian metasedimentary rocks
Felsic-intermediate intrusive rocks
Mafic-ultramafic intrusive rocks
Tholeiitic metavolcanic rocks
Komatiitic metavolcanic rocks
Calc-alkalic metavolcanic rocks
Archean metasedimentary rocks

**Figure 22.** Regional distribution of olivine in till.

concentrates. As with the chromite datasets, high concentrations of olivine occur over a broad area encompassing Zavitz, southern Geikie, western Cleaver and western Fallon townships. Local sources of olivine likely contribute to a significant proportion of the signature. Olivine concentrations are unusually high over a broad region encompassing western McArthur, western Bartlett and northwestern English townships. Ultramafic source rocks have not been recognized within this area. To the west, in southern Fripp Township, elevated to anomalous olivine grain counts are likely associated with narrow xenoliths of peridotitic komatiite that lie within the Kenogamissi Batholith. Pyrrhotitic sulphide mineralization occurs at the contact of one of these xenoliths with the surrounding gneissic diorite and tonalite. A couple of samples straddling the southwest corner of English Township also returned anomalous concentrations of olivine. Ultramafic source rocks have not been recognized within this area, however, the area is characterized by a strong magnetic signature. Additional work is warranted within this area to determine the significance of this mineralogical anomaly.

### *Chalcopyrite*

Chalcopyrite occurs at unusually low levels within the survey area (Figure 23). Background grain counts range between 0 and 2 grains per heavy mineral concentrate. A few samples contain 3 to 4 grains. These samples are situated in northwest Semple Township, southeast Michie Township, north-central Baden Township and northwest Cairo Township. The significance of these single sample anomalies is not known. The anomaly in northwest Semple Township has an anomalous till and lake sediment geochemical signature associated with it as well (Bajc et al. 1996). The geochemical anomaly has a VMS-type base metal association. The anomaly in north-central Baden Township is situated in the vicinity of several gold occurrences where chalcopyrite, malachite, molybdenite and hematite occur as accessories to mineralization (Kresz 1993).

### *Other Minerals*

A number of other minerals of possible economic significance were recovered as part of the heavy mineral processing. Four samples contained anomalous numbers of barite grains. These include: 1) sample 95-AFB-309 in southeast Douglas Township which contained 50% barite; 2) sample 96-AFB-122 in northeast Cairo Township which contained 50% barite; 3) sample 96-AFB-127 in southwestern Cairo Township which contained 5% barite and 5% fluorite; and 4) sample 96-AFB-009 in east-central Powell Township which contained 50% barite and a trace of fluorite. Sample 96-AFB-009 was collected adjacent to the Extender Minerals of Canada Limited barite processing plant and may have been contaminated with plant dust. Additional sampling is recommended in this area to confirm the results presented here. At the time of writing, feed for the mill came from the Yarrow Barite Mine which is situated in the northwest corner of Yarrow Township just west of Mistinikon Lake. Fluorite is a common accessory mineral at this deposit and its occurrence in the heavy mineral concentrates suggests a similar, Proterozoic, vein-type source rock association for the anomaly. Prospecting coupled with higher-density till sampling in the vicinity of all of these anomalous samples is recommended to further refine the location of possible source rocks.

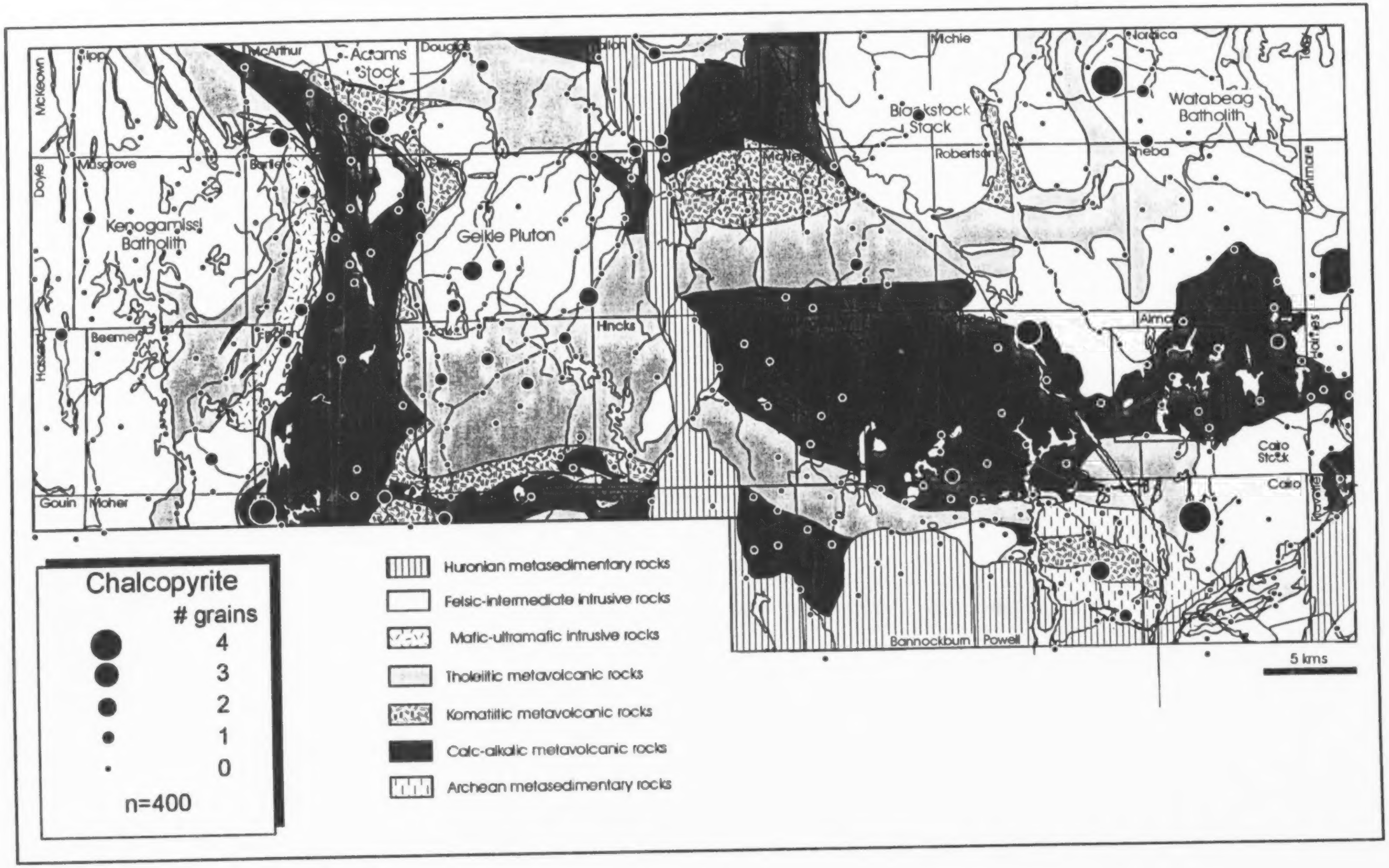

Mckeown
Tipp
McArthur
Adams Stock
Douglas
Mahon
Michie
Nordica
Teefy
Blackstock Stack
Watabeag Batholith
Doyle
Musgrove
Bartlet
Geikie
Holloway
Robertson
Sheba
Dunmore
Kenogamissi Batholith
Geikie Pluton
Hassard
Beemer
Fripp
Carscallen
Hincks
Thackeray
Alma
Haultain
Cairo Stock
Gouin
Moher
Cairo
Bannockburn
Powell
Knowles
5 kms
Chalcopyrite
# grains
● 4
● 3
● 2
• 1
· 0
n=400
▥ Huronian metasedimentary rocks
☐ Felsic-intermediate intrusive rocks
▨ Mafic-ultramafic intrusive rocks
░ Tholeiitic metavolcanic rocks
▩ Komatiitic metavolcanic rocks
■ Calc-alkalic metavolcanic rocks
▥ Archean metasedimentary rocks

Figure 23. Regional distribution of chalcopyrite in till.

A few chromite grains had crystals of chrome-rich andradite, a calcium-iron silicate belonging to the garnet group, attached to them. Andradite may therefore be a useful pathfinder for chromite-bearing mafic and ultramafic source rocks. It can occur in serpentinized ultramafic rocks. Andradite occurs at extremely low levels within the survey area, usually being absent. A number of samples contain single grains and one sample contains 2 grains. Grains occur most frequently over Musgrove, Beemer and western English townships with random occurrences over supracrustal rocks to the east. The significance of the cluster of andradites over the western part of the study area is unknown. Elevated grain counts of chromite, olivine and chrome diopside were obtained from the same region suggesting the presence of mafic-ultramafic source rocks within the region.

A few grains of grossular, a calcium-aluminum silicate belonging to the garnet group, were recovered from the survey area. A cluster of samples collected in the immediate vicinity of the Texmont Mine contained single grains of this mineral. Grossular can occur in metamorphosed basaltic lavas and serpentinites. Its occurrence in the vicinity of the Texmont Mine is therefore in line with the ultramafic source rocks associated with mineralization. Grossular should therefore be considered a useful pathfinder for similar styles of mineralization. The distribution of grossular grains throughout the remaining parts of the study area is random. In several cases, its occurrence is related to known mafic-ultramafic source rocks.

Red rutile, a chromium-titanium oxide, occurs at moderate to low levels within the study area. It occurs at highest concentrations (3 to 11 grains) over the Kenogamissi Batholith and along the outer edges of the Adams Stock. It likely occurs as an accessory mineral within these intrusions. Red rutile also occurs at elevated concentrations within Bartlett, Zavitz and McNeil townships where mafic and ultramafic source rocks occur and where, in the case of Zavitz and McNeil townships, anomalous chromite grain counts were obtained. Its presence within these areas may indicate enhanced potential for Ni-Cu sulphide mineralization.

Gahnite, a zinc-spinel commonly associated with volcanogenic massive sulphide mineralization, occurs at moderate to low levels throughout the survey area. Gahnite grains occur most frequently over the western half of the survey area in clusters of samples containing 1 or 2 grains. Notable clusters of samples occur in north-central Musgrove Township, northwestern Zavitz Township and northeastern Montrose Township. A single sample from south-central Cairo Township contains 2 gahnite grains. It is unclear whether these clusters of grains have economic significance or simply represent isolated occurrences within a background population. The bedrock geology of each anomalous area should be investigated to determine whether favourable host lithologies are present. High priority targets should be further evaluated in terms of existing, published surficial geochemistry and geophysics. Prospecting and higher-density till sampling should be carried out over prospective areas to further refine exploration targets.

### *Summary of MMSIM® Results*

The MMSIM® dataset clearly delineates a number of broad areas where favourable host lithologies for base metal mineralization exist (Figure 24). These are defined, in many instances, by multiple indicator mineral species and supported by till geochemistry. Higher density till sampling and prospecting is recommended within these anomalous areas to determine their significance and possibly refine exploration targets. The patterns depicted by the indicator mineral assemblages associated with high metamorphic grade base metal mineralization are not supported by the regional geochemical and primary mineralogical (i.e., chalcopyrite) datasets. As mentioned previously, this is probably attributed to the low grade of metamorphism present within the belt.

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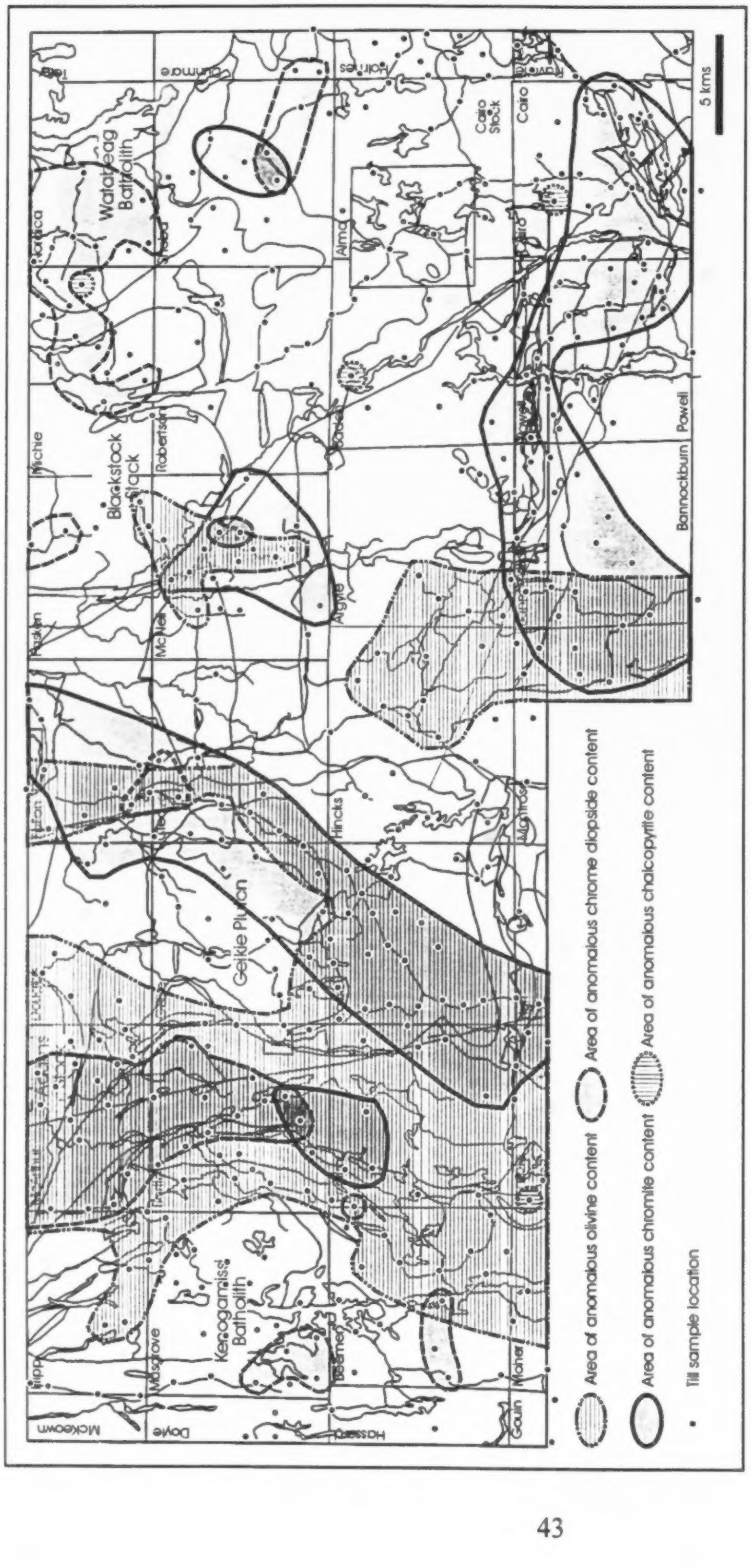
Mckeown
Doyle
Hassard
Gouin
Moher
Musgrove
Kenogamissi Batholith
Geikie Pluton
Hincks
McNeil
Argyle
Robertson
Blackstock Stack
Michie
Watabeag Batholith
Alma
Cairo Stock
Cairo
Powell
Bannockburn
Holmes
Dunmore
5 kms
Area of anomalous olivine content
Area of anomalous chrome diopside content
Area of anomalous chromite content
Area of anomalous chalcopyrite content
Till sample location

**Figure 24.** Base metal exploration targets defined by the indicator mineral datasets.

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## Appendix A. Sample Location Information (NAD 27) and Heavy Mineral Assemblages.

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4004 | 486050 | 5316700 | Almandine-augite-hornblende | epidote-titanite |
| 95-AFB-4005 | 486350 | 5317900 | Almandine-olivine-hornblende | epidote-titanite |
| 95-AFB-4006 | 486200 | 5319700 | Almandine-hornblende | epidote-titanite |
| 95-AFB-4007 | 485950 | 5320700 | Almandine-hornblende-hematite | epidote-titanite |
| 95-AFB-4008 | 486150 | 5321800 | Almandine-hornblende | epidote-titanite |
| 95-AFB-4011 | 485850 | 5323100 | Almandine-hornblende-ilmenite | diopside-epidote-titanite |
| 95-AFB-4013 | 484850 | 5323700 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4018 | 484000 | 5326000 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4020 | 488250 | 5323800 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4021 | 489050 | 5324750 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4022 | 489400 | 5327750 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4024 | 488600 | 5325750 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4025 | 490800 | 5324300 | Almandine-hornblende | diopside-titanite |
| 95-AFB-4026 | 490300 | 5322950 | Almandine-ilmenite-hornblende | diopside-titanite-epidote |
| 95-AFB-4027 | 490750 | 5325500 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4029 | 492950 | 5326850 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4031 | 492850 | 5328400 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4032 | 494300 | 5329200 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4033 | 495050 | 5330450 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4035 | 496000 | 5332050 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4037 | 496950 | 5331400 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4040 | 496400 | 5333600 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4042 | 496800 | 5335900 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4043 | 497100 | 5337450 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4045 | 497300 | 5339300 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4046 | 496400 | 5338450 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4047 | 490750 | 5326800 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4048 | 490850 | 5328200 | Almandine-hornblende-hematite | diopside-epidote-titanite |
| 95-AFB-4052 | 498950 | 5334900 | Hornblende-almandine | diopside-epidote |
| 95-AFB-4054 | 498750 | 5337000 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4055 | 498500 | 5338000 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4058 | 495900 | 5340900 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4062 | 498300 | 5343050 | Hornblende-almandine-hematite | diopside-epidote-titanite |
| 95-AFB-4064 | 495150 | 5342800 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4068 | 490900 | 5317750 | Hornblende-almandine | diopside-epidote-titanite |
| 95-AFB-4071 | 484500 | 5317250 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4073 | 482700 | 5317950 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4076 | 480950 | 5318000 | Augite-almandine-hornblende | epidote-diopside |
| 95-AFB-4077 | 476750 | 5316450 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4078 | 475950 | 5319900 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4079 | 474900 | 5319250 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4081 | 472950 | 5318400 | Augite-almandine | diopside-epidote-titanite |
| 95-AFB-4083 | 472950 | 5320350 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4086 | 471950 | 5322000 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4088 | 472300 | 5324100 | Augite-hornblende-almandine | epidote-diopside |
| 95-AFB-4089 | 473750 | 5324900 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4091 | 474200 | 5326850 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4092 | 475250 | 5326450 | Almandine-hornblende-augite | epidote-diopside-titanite |
| 95-AFB-4094 | 475600 | 5327700 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4095 | 476100 | 5328950 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4097 | 476500 | 5331000 | Hornblende-almandine-ilmenite | epidote-diopside-titanite |
| 95-AFB-4098 | 477200 | 5331900 | Augite-hornblende-almandine | epidote-diopside |
| 95-AFB-4101 | 478000 | 5332650 | Augite-hornblende-almandine | epidote-diopside |
| 95-AFB-4102 | 476700 | 5332850 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4103 | 475550 | 5333750 | Hornblende-almandine-olivine-ilmenite | epidote-diopside-titanite |
| 95-AFB-4104 | 477900 | 5333650 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4105 | 478400 | 5335500 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4107 | 477450 | 5337000 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4108 | 479150 | 5334350 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4109 | 475000 | 5337550 | Almandine-hornblende-ilmenite | epidote-diopside-titanite |
| 95-AFB-4112 | 474650 | 5336550 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4113 | 470950 | 5334650 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4114 | 471200 | 5336050 | Hornblende-almandine | diopside-epidote-titanite |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4115 | 472700 | 5336050 | Augite-hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4117 | 472400 | 5337450 | Almandine-hornblende-ilmenite | epidote-diopside-titanite |
| 95-AFB-4118 | 469150 | 5338750 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4119 | 468950 | 5339750 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4120 | 473000 | 5335050 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4121 | 471900 | 5338500 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4122 | 471100 | 5333350 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4124 | 472350 | 5333300 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4125 | 471200 | 5332100 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4126 | 472550 | 5331250 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4127 | 468500 | 5334550 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4128 | 468400 | 5333350 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4129 | 468750 | 5331700 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4130 | 468950 | 5330650 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4131 | 465850 | 5343800 | Hornblende-almandine | titanite-epidote-diopside |
| 95-AFB-4132 | 465700 | 5342800 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4133 | 465300 | 5340150 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4135 | 465200 | 5337900 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4136 | 465950 | 5336150 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4138 | 466200 | 5334200 | Hornblende-almandine | epidote-titanite-diopside |
| 95-AFB-4139 | 465900 | 5331750 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4140 | 464350 | 5330750 | Hornblende-almandine | titanite-epidote-diopside |
| 95-AFB-4142 | 463000 | 5330750 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4143 | 463050 | 5332350 | Hornblende-almandine | epidote-titanite-diopside |
| 95-AFB-4145 | 501950 | 5335000 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4147 | 503300 | 5333900 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4148 | 506650 | 5334900 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4149 | 497200 | 5344000 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4151 | 500900 | 5343250 | Almandine-hornblende | diopside-epidote |
| 95-AFB-4152 | 501950 | 5343850 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4153 | 506750 | 5333700 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4154 | 506700 | 5332650 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4158 | 510550 | 5317900 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4159 | 511900 | 5317050 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4161 | 514500 | 5317200 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4162 | 514750 | 5316150 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4163 | 514650 | 5318600 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4164 | 513900 | 5319950 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4165 | 514050 | 5320900 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4166 | 515800 | 5317150 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4168 | 517000 | 5316000 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4171 | 520000 | 5316900 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4172 | 521050 | 5316150 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4174 | 530650 | 5316800 | Augite-hornblende-almandine | diopside-epidote-titanite |
| 95-AFB-4175 | 529350 | 5316950 | Augite-hornblende-almandine | diopside-epidote-titanite |
| 95-AFB-4176 | 529100 | 5319700 | Augite-hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4179 | 527350 | 5319650 | Augite-hornblende | epidote-diopside |
| 95-AFB-4181 | 527100 | 5324000 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4182 | 526450 | 5322400 | Augite-almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4183 | 529100 | 5321050 | Augite | diopside-titanite-epidote |
| 95-AFB-4184 | 528550 | 5322050 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4185 | 525600 | 5320650 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4186 | 525650 | 5324750 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4187 | 524100 | 5325950 | Augite-hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4188 | 523000 | 5326600 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4189 | 522200 | 5327750 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4190 | 520700 | 5329050 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4191 | 520350 | 5330150 | Augite-hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4192 | 519500 | 5331750 | Hornblende-almandine-augite | epidote-titanite-diopside |
| 95-AFB-4193 | 493250 | 5319400 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4195 | 492550 | 5320000 | Almandine-hornblende-augite | epidote-diopside-titanite |
| 95-AFB-4196 | 491750 | 5326050 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4198 | 535350 | 5325100 | Augite-hornblende-almandine | epidote-titanite-diopside |
| 95-AFB-4199 | 534350 | 5324800 | Augite-hornblende | diopside-epidote-titanite |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4201 | 533100 | 5326000 | Augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4203 | 532800 | 5327950 | Augite-hornblende-almandine | diopside-epidote-titanite |
| 95-AFB-4204 | 533100 | 5329450 | Augite-almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4205 | 534900 | 5326300 | Hornblende-almandine-hematite | titanite-epidote-diopside |
| 95-AFB-4206 | 465800 | 5329950 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4207 | 466150 | 5328450 | Hornblende-almandine-augite | epidote-diopside-titanite |
| 95-AFB-4208 | 467600 | 5330100 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4211 | 492700 | 5324550 | Hornblende-almandine | diopside-epidote |
| 95-AFB-4212 | 529650 | 5341050 | Hornblende-augite-almandine | diopside-epidote-titanite |
| 95-AFB-4213 | 526300 | 5341650 | Hornblende-augite-almandine | diopside-epidote-almandine |
| 95-AFB-4214 | 525750 | 5342750 | Hornblende-almandine-augite | epidote-diopside |
| 95-AFB-4215 | 525050 | 5343700 | Hornblende-augite-almandine | diopside-epidote-titanite |
| 95-AFB-4216 | 523950 | 5343050 | Hornblende-almandine-augite | diopside-titanite-epidote |
| 95-AFB-4218 | 523850 | 5341100 | Hornblende-augite-almandine | diopside-titanite-epidote |
| 95-AFB-4219 | 522700 | 5341800 | Almandine-augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4220 | 522250 | 5343250 | Augite-hornblende-almandine | diopside-titanite |
| 95-AFB-4222 | 521100 | 5341450 | Almandine-hornblende-augite | epidote-diopside-titanite |
| 95-AFB-4224 | 519650 | 5342400 | Augite-hornblende-almandine | diopside-epidote |
| 95-AFB-4225 | 520500 | 5340250 | Almandine-hornblende-augite | diopside-epidote |
| 95-AFB-4226 | 519150 | 5339750 | Almandine-hornblende-augite | epidote-diopside |
| 95-AFB-4227 | 525850 | 5340450 | Almandine-hornblende-augite | diopside-epidote-titanite |
| 95-AFB-4228 | 525550 | 5338650 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4229 | 526000 | 5337600 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4231 | 520100 | 5338600 | Almandine-augite-hornblende | epidote-titanite |
| 95-AFB-4232 | 518800 | 5337750 | Hornblende-almandine | diopside-epidote |
| 95-AFB-4233 | 496500 | 5320000 | Almandine-hornblende-augite | diopside-epidote |
| 95-AFB-4234 | 495800 | 5322650 | Almandine-hornblende | diopside-epidote |
| 95-AFB-4238 | 528250 | 5337950 | Hornblende-almandine | epidote-diopside |
| 95-AFB-4241 | 529400 | 5336600 | Augite-hornblende-almandine | epidote-diopside |
| 95-AFB-4243 | 529700 | 5335300 | Augite-hornblende-almandine | diopside-epidote-titanite |
| 95-AFB-4244 | 527800 | 5334150 | Augite-almandine | epidote-titanite |
| 95-AFB-4245 | 527200 | 5335400 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 95-AFB-4246 | 529400 | 5333550 | Almandine-augite-hornblende | diopside-titanite-epidote |
| 95-AFB-4247 | 530250 | 5332450 | Augite-almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4248 | 530700 | 5331250 | Almandine-hornblende | diopside-epidote |
| 95-AFB-4249 | 510100 | 5343800 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4250 | 510850 | 5341950 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4251 | 511000 | 5340300 | Almandine-hornblende | epidote-titanite |
| 95-AFB-4252 | 512200 | 5339900 | Almandine-hornblende | epidote-titanite |
| 95-AFB-4253 | 513100 | 5339200 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4254 | 512350 | 5338000 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4255 | 511050 | 5337550 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4256 | 510400 | 5336750 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4257 | 508300 | 5336350 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4258 | 508700 | 5335350 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4259 | 508350 | 5334100 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4260 | 509250 | 5332750 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4261 | 509850 | 5334600 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4262 | 510750 | 5333750 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4263 | 510800 | 5332650 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4264 | 509900 | 5331900 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4265 | 509500 | 5330750 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4266 | 509900 | 5329850 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4267 | 511100 | 5329600 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4268 | 488100 | 5327575 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4269 | 486800 | 5327400 | Almandine-augite-hornblende | diopside-titanite |
| 95-AFB-4270 | 486700 | 5328850 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4271 | 488450 | 5328900 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4272 | 519050 | 5326750 | Augite-almandine | epidote-diopside |
| 95-AFB-4273 | 520000 | 5323900 | Almandine | epidote-diopside-titanite |
| 95-AFB-4274 | 470150 | 5329400 | Almandine-augite-hornblende | diopside-epidote |
| 95-AFB-4275 | 468350 | 5328500 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4276 | 470300 | 5327250 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4277 | 468650 | 5326400 | Almandine-hornblende | epidote-diopside |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4278 | 513600 | 5332300 | Almandine-augite | epidote-diopside-titanite |
| 95-AFB-4279 | 517350 | 5334250 | Almandine-augite | epidote-titanite-diopside |
| 95-AFB-4280 | 516900 | 5337400 | Augite-almandine | diopside-titanite- |
| 95-AFB-4281 | 520750 | 5335000 | Almandine-hornblende-augite | diopside-titanite |
| 95-AFB-4282 | 525550 | 5333550 | Augite-almandine | diopside-epidote-titanite |
| 95-AFB-4283 | 529250 | 5330750 | Augite-almandine | diopside-epidote-titanite |
| 95-AFB-4284 | 524500 | 5331000 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 95-AFB-4285 | 521850 | 5331350 | Augite-almandine-hornblende | diopside-epidote |
| 95-AFB-4286 | 517650 | 5339950 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 95-AFB-4287 | 522450 | 5336000 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4288 | 522775 | 5333950 | Almandine-augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4289 | 527191 | 5331295 | Augite-almandine-hornblende | diopside-titanite |
| 95-AFB-4290 | 527700 | 5327200 | Augite-almandine-hornblende | epidote-titanite |
| 95-AFB-4291 | 529650 | 5325600 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4292 | 532900 | 5319450 | Augite-almandine | titanite-epidote |
| 95-AFB-4293 | 521050 | 5319150 | Augite-almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4294 | 516600 | 5319250 | Almandine-augite-hornblende | titanite-diopside |
| 95-AFB-4295 | 517425 | 5322057 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4296 | 522991 | 5322605 | Augite | epidote-rutile |
| 95-AFB-4297 | 517300 | 5325800 | Augite-almandine | epidote-titanite-diopside |
| 95-AFB-4298 | 506950 | 5328350 | Almandine-augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4299 | 508500 | 5323150 | Augite-almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4300 | 504800 | 5319750 | Almandine-augite-hornblende | diopside-titanite-epidote |
| 95-AFB-4301 | 501100 | 5317050 | Almandine-augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4302 | 501000 | 5319000 | Almandine-hornblende | epidote |
| 95-AFB-4303 | 493650 | 5321100 | Almandine-hornblende-augite | epidote-titanite-diopside |
| 95-AFB-4304 | 498100 | 5324450 | Almandine-hornblende-augite | diopside-epidote |
| 95-AFB-4305 | 496900 | 5325900 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4306 | 500250 | 5327750 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4308 | 493041 | 5333549 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4309 | 491200 | 5339750 | Almandine-hornblende | barite-epidote |
| 95-AFB-4310 | 483700 | 5335200 | Almandine-hornblende-augite | diopside |
| 95-AFB-4311 | 484800 | 5332800 | Almandine-hornblende | diopside-titanite-epidote |
| 95-AFB-4312 | 479750 | 5329400 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4313 | 488950 | 5322050 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 95-AFB-4314 | 481100 | 5319550 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4315 | 475700 | 5317200 | Augite-almandine | epidote |
| 95-AFB-4316 | 469300 | 5318100 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4317 | 463550 | 5322250 | Hornblende | epidote-titanite |
| 95-AFB-4318 | 466200 | 5321550 | Almandine-hornblende-augite | diopside-epidote-titanite |
| 95-AFB-4320 | 472100 | 5326050 | Almandine-hornblende-augite | diopside |
| 95-AFB-4321 | 466479 | 5326462 | Almandine-augite | epidote-diopside-titanite |
| 95-AFB-4322 | 464450 | 5327700 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4323 | 476650 | 5335650 | Almandine-olivine-hornblende | epidote-diopside |
| 95-AFB-4501 | 485950 | 5324650 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4502 | 485700 | 5325950 | Almandine-augite | epidote-diopside-titanite |
| 95-AFB-4503 | 485100 | 5327300 | Almandine-hornblende | diopside-titanite |
| 95-AFB-4505 | 484550 | 5328900 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4506 | 484850 | 5330250 | Almandine-augite-hornblende | diopside-epidote-titanite |
| 95-AFB-4508 | 486400 | 5330450 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4511 | 489300 | 5331100 | Almandine-hornblende-augite | epidote-diopside-titanite |
| 95-AFB-4513 | 490400 | 5330900 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4515 | 488250 | 5334350 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4519 | 490400 | 5334350 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4521 | 491100 | 5335950 | Almandine-hornblende | titanite-epidote-diopside |
| 95-AFB-4522 | 492700 | 5336850 | Almandine-hornblende | diopside-titanite |
| 95-AFB-4524 | 494350 | 5339800 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4525 | 494750 | 5337200 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4527 | 494900 | 5335250 | Almandine-hornblende | diopside-titanite |
| 95-AFB-4528 | 494550 | 5333600 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4529 | 493700 | 5331750 | Almandine-hornblende | diopside-epidote-titanite |
| 95-AFB-4533 | 493300 | 5340750 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4536 | 480250 | 5325850 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4538 | 480850 | 5331250 | Almandine-hornblende | diopside-titanite-epidote |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4540 | 480000 | 5332750 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4542 | 480950 | 5334450 | Hornblende-almandine-augite | epidote-diopside |
| 95-AFB-4544 | 477000 | 5338600 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4545 | 475400 | 5339300 | Almandine-ilmenite-olivine-hornblende | epidote-titanite-diopside |
| 95-AFB-4546 | 475150 | 5340650 | Almandine-olivine-ilmenite | epidote-diopside-titanite |
| 95-AFB-4547 | 475100 | 5342650 | Olivine-almandine-ilmenite | epidote-diopside-titanite |
| 95-AFB-4551 | 482250 | 5343400 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4552 | 481500 | 5342450 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4553 | 482750 | 5341350 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4554 | 486300 | 5341600 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4556 | 486100 | 5339050 | Hornblende-almandine-augite | epidote-diopside-titanite |
| 95-AFB-4558 | 487550 | 5343150 | Augite-almandine | epidote-diopside |
| 95-AFB-4559 | 488550 | 5342500 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4561 | 482700 | 5339150 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4562 | 481850 | 5340200 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4563 | 478750 | 5341100 | Almandine-hornblende | titanite-diopside |
| 95-AFB-4565 | 497700 | 5317350 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4566 | 498750 | 5320050 | Almandine-augite-hornblende | diopside-epidote |
| 95-AFB-4567 | 500050 | 5322100 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4568 | 501950 | 5322900 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4569 | 504250 | 5322700 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4570 | 507300 | 5322100 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4571 | 506650 | 5320500 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4573 | 506400 | 5318650 | Almandine-augite | epidote-diopside- |
| 95-AFB-4581 | 504450 | 5325300 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4582 | 503000 | 5326350 | Almandine-hornblende-augite | diopside-epidote |
| 95-AFB-4585 | 535150 | 5317150 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4588 | 534800 | 5319550 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4590 | 535700 | 5321350 | Augite-almandine | epidote-titanite |
| 95-AFB-4592 | 536950 | 5322800 | Augite-almandine | epidote-titanite-diopside |
| 95-AFB-4594 | 535950 | 5319800 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4595 | 536900 | 5321050 | Augite | epidote-diopside-titanite |
| 95-AFB-4597 | 536400 | 5318000 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4598 | 536150 | 5315850 | Augite-almandine | epidote-diopside |
| 95-AFB-4602 | 533450 | 5321050 | Augite-almandine | epidote-diopside |
| 95-AFB-4603 | 484000 | 5316200 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4605 | 487800 | 5330750 | Augite-almandine | epidote-titanite-diopside |
| 95-AFB-4606 | 505400 | 5328950 | Almandine-hornblende-augite | epidote-diopside |
| 95-AFB-4607 | 534800 | 5322750 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4608 | 535550 | 5323100 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4609 | 535850 | 5324300 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4610 | 531950 | 5322550 | Augite-almandine-hornblende | epidote-diopside |
| 95-AFB-4611 | 536500 | 5325500 | Augite | diopside-epidote-titanite |
| 95-AFB-4612 | 536700 | 5324000 | Augite-almandine | epidote-diopside-titanite |
| 95-AFB-4616 | 534950 | 5328450 | Augite | titanite-diopside-epidote |
| 95-AFB-4617 | 535050 | 5329750 | Augite-almandine | diopside-titanite-epidote |
| 95-AFB-4618 | 537200 | 5328800 | Augite-hornblende-almandine | titanite-epidote-diopside |
| 95-AFB-4619 | 531450 | 5334350 | Augite-almandine | epidote-titanite-diopside |
| 95-AFB-4620 | 483700 | 5323100 | Olivine-almandine-augite | diopside-epidote-titanite |
| 95-AFB-4621 | 484100 | 5321650 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4623 | 477250 | 5325500 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4624 | 475950 | 5323150 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4625 | 478100 | 5328750 | Augite-almandine | epidote-diopside |
| 95-AFB-4626 | 477200 | 5326950 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4627 | 495150 | 5324150 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4629 | 493550 | 5325750 | Almandine-augite-hornblende | epidote-diopside |
| 95-AFB-4630 | 483100 | 5338350 | Almandine-hornblende-augite | diopside-titanite-epidote |
| 95-AFB-4631 | 484550 | 5338750 | Almandine-augite-hornblende | titanite-diopside |
| 95-AFB-4632 | 484000 | 5340100 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 95-AFB-4633 | 480600 | 5339650 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4634 | 479750 | 5341650 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4635 | 480550 | 5343200 | Almandine-hornblende | epidote-titanite-diopside |
| 95-AFB-4636 | 501600 | 5324950 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4637 | 501150 | 5323650 | Almandine-hornblende | epidote-diopside |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 95-AFB-4638 | 483660 | 5334300 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4639 | 484900 | 5334500 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4640 | 482050 | 5331900 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4641 | 462850 | 5316000 | Hornblende-augite-almandine | epidote-zircon |
| 95-AFB-4644 | 465150 | 5315850 | Almandine-hornblende | epidote-diopside |
| 95-AFB-4645 | 466750 | 5316200 | Almandine-hornblende-augite | epidote-diopside |
| 95-AFB-4646 | 466400 | 5318750 | Almandine-hornblende-augite | diopside-epidote |
| 95-AFB-4648 | 467750 | 5322250 | Hornblende-almandine | epidote-diopside-titanite |
| 95-AFB-4649 | 519100 | 5317400 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 95-AFB-4650 | 518800 | 5320250 | Augite-almandine-hornblende | epidote-titanite |
| 95-AFB-4651 | 470850 | 5317250 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4652 | 471800 | 5319500 | Augite-hornblende-almandine | epidote-diopside |
| 95-AFB-4653 | 470300 | 5321800 | Almandine-hornblende-augite | epidote-diopside |
| 95-AFB-4654 | 469000 | 5325150 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4656 | 481050 | 5330200 | Almandine-hornblende-augite | epidote-diopside |
| 95-AFB-4657 | 483950 | 5341600 | Almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4659 | 481000 | 5337200 | Almandine-hornblende-augite | epidote-diopside-titanite |
| 95-AFB-4660 | 523000 | 5316250 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4661 | 523350 | 5317600 | Augite-almandine-hornblende | epidote-diopside |
| 95-AFB-4662 | 512950 | 5318050 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 95-AFB-4663 | 495550 | 5319400 | Hornblende-almandine | diopside-epidote-titanite |
| 96-AFB-4006 | 516255 | 5315700 | Almandine-hornblende | epidote-titanite-diopside |
| 96-AFB-4007 | 522205 | 5315190 | Augite | epidote-diopside-titanite |
| 96-AFB-4009 | 522840 | 5313025 | Augite-almandine | barite-epidote-diopside-titanite |
| 96-AFB-4010 | 521600 | 5312825 | Augite-hornblende | titanite-diopside-epidote |
| 96-AFB-4025 | 524335 | 5310420 | Augite | epidote-diopside-titanite |
| 96-AFB-4043 | 522605 | 5310140 | Augite-hornblende-almandine | epidote-diopside-titanite |
| 96-AFB-4044 | 512895 | 5315920 | Hornblende-almandine | epidote-titanite-diopside |
| 96-AFB-4046 | 523975 | 5311690 | Augite-almandine-hornblende | epidote-diopside-titanite |
| 96-AFB-4048 | 522105 | 5311295 | Augite | epidote-diopside-titanite |
| 96-AFB-4049 | 520270 | 5308555 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4052 | 534800 | 5314850 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4054 | 533550 | 5314300 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 96-AFB-4057 | 532600 | 5312450 | Almandine-augite | epidote-titanite-diopside |
| 96-AFB-4058 | 532575 | 5311530 | Augite-almandine-hornblende | epidote-titanite-diopside |
| 96-AFB-4061 | 530700 | 5311800 | Almandine-augite-hornblende | epidote-titanite-diopside |
| 96-AFB-4062 | 528981 | 5311800 | Augite-hornblende-almandine | epidote-titanite-diopside |
| 96-AFB-4063 | 528955 | 5312965 | Augite-almandine-hornblende | titanite-epidote |
| 96-AFB-4064 | 528005 | 5314175 | Augite | titanite-epidote-diopside |
| 96-AFB-4066 | 529695 | 5314600 | Augite-almandine | titanite-epidote-diopside |
| 96-AFB-4068 | 529665 | 5315620 | Augite-hornblende | titanite-epidote-diopside |
| 96-AFB-4069 | 530150 | 5309990 | Augite-almandine | diopside-epidote-titanite |
| 96-AFB-4070 | 536090 | 5309520 | Augite-almandine | epidote-diopside-titanite |
| 96-AFB-4081 | 507975 | 5316030 | Almandine-augite | diopside-epidote-titanite |
| 96-AFB-4084 | 507755 | 5314760 | Augite-almandine | epidote |
| 96-AFB-4086 | 506530 | 5310755 | Augite-almandine | epidote-diopside |
| 96-AFB-4087 | 507300 | 5308245 | Augite-almandine | epidote-diopside |
| 96-AFB-4092 | 517480 | 5315120 | Augite-almandine-hornblende | epidote-diopside |
| 96-AFB-4094 | 520665 | 5312295 | Augite-almandine | epidote-diopside-titanite |
| 96-AFB-4096 | 504965 | 5317885 | Augite-almandine | epidote-diopside |
| 96-AFB-4097 | 503395 | 5317540 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4098 | 504735 | 5316725 | Almandine-augite | epidote-diopside |
| 96-AFB-4099 | 506423 | 5315645 | Almandine-augite-hornblende | epidote-diopside |
| 96-AFB-4100 | 503425 | 5314530 | Almandine-augite | epidote-diopside |
| 96-AFB-4101 | 502960 | 5312930 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4102 | 504765 | 5314755 | Almandine-augite-hornblende | epidote-diopside |
| 96-AFB-4103 | 505930 | 5312210 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4104 | 509250 | 5311780 | Almandine-augite | epidote-diopside |
| 96-AFB-4105 | 510305 | 5313650 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4106 | 511615 | 5313030 | Almandine-hornblende | epidote-diopside |
| 96-AFB-4107 | 511140 | 5315425 | Almandine-hornblende-augite | epidote-diopside |
| 96-AFB-4110 | 513850 | 5314705 | Almandine-hornblende | epidote-titanite-diopside |
| 96-AFB-4111 | 516620 | 5312760 | Augite | epidote-titanite |
| 96-AFB-4112 | 517820 | 5313835 | Almandine-augite | titanite-diopside-epidote |

| Sample # | Easting | Northing | Paramagnetic Assemblage | Non-magnetic Assemblage |
|---|---|---|---|---|
| 96-AFB-4113 | 521110 | 5314720 | Almandine-augite | epidote-titanite-diopside |
| 96-AFB-4115 | 523985 | 5315695 | Almandine-augite | epidote-titanite |
| 96-AFB-4117 | 524666 | 5312970 | Augite-almandine | diopside-pyrite-epidote |
| 96-AFB-4118 | 524906 | 5311175 | Augite-almandine | epidote-titanite-diopside |
| 96-AFB-4119 | 526060 | 5310915 | Augite-almandine | epidote-titanite-diopside |
| 96-AFB-4120 | 525265 | 5314390 | Augite-almandine | epidote-titanite-diopside |
| 96-AFB-4121 | 528250 | 5315990 | Augite-almandine | epidote-diopside-titanite |
| 96-AFB-4122 | 532390 | 5315830 | Augite | barite-titanite |
| 96-AFB-4123 | 532800 | 5313355 | Augite-almandine | titanite-epidote-diopside |
| 96-AFB-4124 | 534300 | 5312755 | Augite-almandine | epidote-titanite |
| 96-AFB-4125 | 532700 | 5310835 | Augite-almandine | titanite-epidote-diopside |
| 96-AFB-4126 | 528770 | 5308130 | Augite | epidote-titanite-diopside |
| 96-AFB-4127 | 528780 | 5309035 | Almandine-augite | titanite-epidote |
| 96-AFB-4128 | 518360 | 5316280 | Almandine-augite-hornblende | epidote-diopside-titanite |
| 96-AFB-4151 | 507705 | 5317460 | Almandine-augite-hornblende | diopside-epidote |
| 96-AFB-4175 | 508370 | 5318225 | Almandine-augite | epidote-diopside |
| 96-AFB-4176 | 523530 | 5310205 | Augite-hornblende | epidote-diopside |

## Appendix B. MMSIM® grain counts.

KY: kyanite
SIL: sillimanite
RR: red rutile
GA: gahnite
SP: coloured spinel
CD: chrome diopside
CO: corundum
TO: topaz
SA: sapphirine
ANDR: andradite
EP: epidote
GR: grossular
ANDA: andalusite
ST: staurolite
OL: fayalite
OPX: orthopyroxene
CR: chromite
SPS: spessartine
GTH: goethite
PY: pyrite
CPY: chalcopyrite
BA: barite
FL: fluorite

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4004 | 486050 | 5316700 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 100 | 0 | 0 | 0 | 1 | 0 | 0 |
| 95-AFB-4005 | 486350 | 5317900 | Tr | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 25 | Tr | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4006 | 486200 | 5319700 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 2 | 75 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4007 | 485950 | 5320700 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4008 | 486150 | 5321800 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | Tr | 60 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4011 | 485850 | 5323100 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | Tr | 200 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4013 | 484850 | 5323700 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0.5 | 5 | Tr | 75 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4018 | 484000 | 5326000 | Tr | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | 0 | 50 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4020 | 488250 | 5323800 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4021 | 489050 | 5324750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Tr | 5 | Tr | 60 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4022 | 489400 | 5327750 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | 3 | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4024 | 488600 | 5325750 | 0 | Tr | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | Tr | 50 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4025 | 490800 | 5324300 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 25 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4026 | 490300 | 5322950 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 10 | 2 | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4027 | 490750 | 5325500 | Tr | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 2 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4029 | 492950 | 5326850 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 1 | 25 | 0 | 0 | Tr | 1 | 0 | 0 |
| 95-AFB-4031 | 492850 | 5328400 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4032 | 494300 | 5329200 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 5 | Tr | 20 | 0 | 0 | Tr | 2 | 0 | 0 |
| 95-AFB-4033 | 495050 | 5330450 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 0.5 | Tr | 60 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4035 | 496000 | 5332050 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 3 | 4 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4037 | 496950 | 5331400 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 2 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4040 | 496400 | 5333600 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 2 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4042 | 496800 | 5335900 | Tr | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4043 | 497100 | 5337450 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 2 | 20 | 0 | 0 | 0 | 1 | 0 | 0 |
| 95-AFB-4045 | 497300 | 5339300 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4046 | 496400 | 5338450 | Tr | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 10 | 2 | 75 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4047 | 490750 | 5326800 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4048 | 490850 | 5328200 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4052 | 498950 | 5334900 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 60 | Tr | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4054 | 498750 | 5337000 | Tr | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4055 | 498500 | 5338000 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Tr | Tr | 1 | 40 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4058 | 495900 | 5340900 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4062 | 498300 | 5343050 | Tr | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 8 | 1 | 40 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4064 | 495150 | 5342800 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 5 | 1 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4068 | 490900 | 5317750 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4071 | 484500 | 5317250 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 10 | 1 | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4073 | 482700 | 5317950 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | 1 | 50 | 0 | Tr | 1 | 1 | 0 | 0 |
| 95-AFB-4076 | 480950 | 5318000 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 1 | 15 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4077 | 476750 | 5316450 | Tr | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 1 | 15 | 0 | Tr | Tr | 0 | 0 | Tr |
| 95-AFB-4078 | 475950 | 5319900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 12 | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4079 | 474900 | 5319250 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 10 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4081 | 472950 | 5318400 | Tr | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4083 | 472950 | 5320350 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 15 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4086 | 471950 | 5322000 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4088 | 472300 | 5324100 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4089 | 473750 | 5324900 | 0 | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4091 | 474200 | 5326850 | Tr | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Tr | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4092 | 475250 | 5326450 | Tr | 0 | 1 | 0 | 1 | 4 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Tr | 10 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4094 | 475600 | 5327700 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 5 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4095 | 476100 | 5328950 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4097 | 476500 | 5331000 | Tr | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 5 | Tr | 25 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4098 | 477200 | 5331900 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 1 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4101 | 478000 | 5332650 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 10 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4102 | 476700 | 5332850 | Tr | 0 | 3 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4103 | 475550 | 5333750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 20 | Tr | 5 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4104 | 477900 | 5333650 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 5 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4105 | 478400 | 5335500 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 15 | 0 | 0 | Tr | 1 | 0 | 0 |
| 95-AFB-4107 | 477450 | 5337000 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 5 | 0 | 2 | 2 | 0 | 0 | 0 |
| 95-AFB-4108 | 479150 | 5334350 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4109 | 475000 | 5337550 | Tr | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 6 | Tr | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4112 | 474650 | 5336550 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4113 | 470950 | 5334650 | 0 | Tr | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 60 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4114 | 471200 | 5336050 | 0 | Tr | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4115 | 472700 | 5336050 | Tr | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 30 | 0 | Tr | 5 | 0 | 0 | 0 |
| 95-AFB-4117 | 472400 | 5337450 | Tr | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 6 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4118 | 469150 | 5338750 | Tr | 0 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 2 | Tr | 10 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4119 | 468950 | 5339750 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 10 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4120 | 473000 | 5335050 | 0 | Tr | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 1 | 0 | 0 | 0 | 0.5 | 0 | 0 | 0 |
| 95-AFB-4121 | 471900 | 5338500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4122 | 471100 | 5333350 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4124 | 472350 | 5333300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4125 | 471200 | 5332100 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 0 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4126 | 472550 | 5331250 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4127 | 468500 | 5334550 | Tr | 0 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 0 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4128 | 468400 | 5333350 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | Tr | 0 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4129 | 468750 | 5331700 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4130 | 468950 | 5330650 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4131 | 465850 | 5343800 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4132 | 465700 | 5342800 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4133 | 465300 | 5340150 | Tr | 0 | 10 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4135 | 465200 | 5337900 | Tr | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4136 | 465950 | 5336150 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4138 | 466200 | 5334200 | Tr | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 10 | 0 | Tr | 2 | 1 | 0 | 0 |
| 95-AFB-4139 | 465900 | 5331750 | Tr | 0 | 6 | 1 | 1 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 1 | Tr | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4140 | 464350 | 5330750 | Tr | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 30 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4142 | 463000 | 5330750 | 0.5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 0 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4143 | 463050 | 5332350 | Tr | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 20 | 0 | Tr | 1 | 0 | 0 | 0 |
| 95-AFB-4145 | 501950 | 5335000 | Tr | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 85 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4147 | 503300 | 5333900 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | Tr | 2 | 0 | 0 | 0 |
| 95-AFB-4148 | 506650 | 5334900 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4149 | 497200 | 5344000 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4151 | 500900 | 5343250 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4152 | 501950 | 5343850 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | 1 | 0 | 0 | 0 |
| 95-AFB-4153 | 506750 | 5333700 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4154 | 506700 | 5332650 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4158 | 510550 | 5317900 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4159 | 511900 | 5317050 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 75 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4161 | 514500 | 5317200 | Tr | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4162 | 514750 | 5316150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4163 | 514650 | 5318600 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 30 | 0 | Tr | 4 | 1 | 0 | 0 |
| 95-AFB-4164 | 513900 | 5319950 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4165 | 514050 | 5320900 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Tr | Tr | Tr | 25 | Tr | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4166 | 515800 | 5317150 | 0 | Tr | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4168 | 517000 | 5316000 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4171 | 520000 | 5316900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0.5 | 0 | 0 | 0 |
| 95-AFB-4172 | 521050 | 5316150 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4174 | 530650 | 5316800 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4175 | 529350 | 5316950 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4176 | 529100 | 5319700 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4179 | 527350 | 5319650 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 5 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4181 | 527100 | 5324000 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4182 | 526450 | 5322400 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4183 | 529100 | 5321050 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 0 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4184 | 528550 | 5322050 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Tr | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4185 | 525600 | 5320650 | Tr | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4186 | 525650 | 5324750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4187 | 524100 | 5325950 | Tr | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 0 | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4188 | 523000 | 5326600 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4189 | 522200 | 5327750 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | Tr | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4190 | 520700 | 5329050 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4191 | 520350 | 5330150 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4192 | 519500 | 5331750 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 35 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4193 | 493250 | 5319400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4195 | 492550 | 5320000 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4196 | 491750 | 5326050 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 60 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4198 | 535350 | 5325100 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4199 | 534350 | 5324800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4201 | 533100 | 5326000 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4203 | 532800 | 5327950 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4204 | 533100 | 5329450 | Tr | Tr | 1 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4205 | 534900 | 5326300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 5 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4206 | 465800 | 5329950 | Tr | Tr | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 5 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4207 | 466150 | 5328450 | Tr | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 5 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4208 | 467600 | 5330100 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4211 | 492700 | 5324550 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4212 | 529650 | 5341050 | Tr | Tr | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4213 | 526300 | 5341650 | 0 | Tr | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4214 | 525750 | 5342750 | Tr | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4215 | 525050 | 5343700 | Tr | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4216 | 523950 | 5343050 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 0.5 | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4218 | 523850 | 5341100 | Tr | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 10 | 0 | Tr | 0.5 | 4 | 0 | 0 |
| 95-AFB-4219 | 522700 | 5341800 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4220 | 522250 | 5343250 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4222 | 521100 | 5341450 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0.5 | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4224 | 519650 | 5342400 | Tr | 0 | 1 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4225 | 520500 | 5340250 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 25 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4226 | 519150 | 5339750 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4227 | 525850 | 5340450 | Tr | 0 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 30 | 0 | Tr | 0 | 1 | 0 | 0 |
| 95-AFB-4228 | 525550 | 5338650 | Tr | Tr | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | 0.5 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4229 | 526000 | 5337600 | Tr | 0 | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 1 | 10 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4231 | 520100 | 5338600 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 75 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4232 | 518800 | 5337750 | Tr | Tr | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4233 | 496500 | 5320000 | Tr | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4234 | 495800 | 5322650 | Tr | 0 | 1 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 1 | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4238 | 528250 | 5337950 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 1 | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4241 | 529400 | 5336600 | Tr | Tr | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 2 | 15 | 0 | 0 | Tr | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4243 | 529700 | 5335300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4244 | 527800 | 5334150 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4245 | 527200 | 5335400 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 45 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4246 | 529400 | 5333550 | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 | 1 | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4247 | 530250 | 5332450 | 0 | Tr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 75 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4248 | 530700 | 5331250 | Tr | 0 | 4 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 0.5 | 200 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4249 | 510100 | 5343800 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 75 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4250 | 510850 | 5341950 | Tr | 0 | 0 | 1 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 | Tr | 100 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4251 | 511000 | 5340300 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4252 | 512200 | 5339900 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4253 | 513100 | 5339200 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | 0 | 1 | 0 | 0 |
| 95-AFB-4254 | 512350 | 5338000 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 20 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4255 | 511050 | 5337550 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | Tr | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4256 | 510400 | 5336750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4257 | 508300 | 5336350 | Tr | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 60 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4258 | 508700 | 5335350 | Tr | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 80 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4259 | 508350 | 5334100 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4260 | 509250 | 5332750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 45 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4261 | 509850 | 5334600 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 80 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4262 | 510750 | 5333750 | Tr | 0 | 4 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Tr | 1 | 0.5 | 225 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4263 | 510800 | 5332650 | Tr | 0 | 1 | 0 | 0 | 4 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 110 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4264 | 509900 | 5331900 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 0.5 | 120 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4265 | 509500 | 5330750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 120 | 0 | 0 | 0 | 1 | 0 | 0 |
| 95-AFB-4266 | 509900 | 5329850 | Tr | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | Tr | 250 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4267 | 511100 | 5329600 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 175 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4268 | 488100 | 5327575 | Tr | Tr | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | Tr | 100 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4269 | 486800 | 5327400 | Tr | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 90 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4270 | 486700 | 5328850 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | Tr | 50 | 0 | 0 | 0 | 1 | 0 | 0 |
| 95-AFB-4271 | 488450 | 5328900 | Tr | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | 0.5 | 80 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4272 | 519050 | 5326750 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | 0.5 | 0.5 | 3 | 0 | 0 |
| 95-AFB-4273 | 520000 | 5323900 | Tr | Tr | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 500 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4274 | 470150 | 5329400 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | Tr | 1 | Tr | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4275 | 468350 | 5328500 | Tr | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | Tr | 60 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4276 | 470300 | 5327250 | Tr | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 1 | Tr | 30 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4277 | 468650 | 5326400 | Tr | Tr | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4278 | 513600 | 5332300 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 110 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4279 | 517350 | 5334250 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 0.5 | Tr | 60 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4280 | 516900 | 5337400 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4281 | 520750 | 5335000 | Tr | 0 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 20 | Tr | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4282 | 525550 | 5333550 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 2 | 40 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4283 | 529250 | 5330750 | 0 | 0 | 2 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4284 | 524500 | 5331000 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 3 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4285 | 521850 | 5331350 | Tr | 0 | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4286 | 517650 | 5339950 | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 0.5 | 30 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4287 | 522450 | 5336000 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 0.5 | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4288 | 522775 | 5333950 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 0.5 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4289 | 527191 | 5331295 | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0.5 | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4290 | 527700 | 5327200 | 0 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 20 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4291 | 529650 | 5325600 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | 0.5 | 20 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4292 | 532900 | 5319450 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | 4 | Tr | 0 | 0 | 0 |
| 95-AFB-4293 | 521050 | 5319150 | Tr | Tr | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4294 | 516600 | 5319250 | Tr | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0.5 | Tr | 30 | 0 | 0 | Tr | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4295 | 517425 | 5322057 | Tr | Tr | 2 | 0 | 0 | 1 | 8 | 2 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 0.5 | 45 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4296 | 522991 | 5322605 | Tr | Tr | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4297 | 517300 | 5325800 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4298 | 506950 | 5328350 | Tr | Tr | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 0.5 | 700 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4299 | 508500 | 5323150 | 0 | Tr | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4300 | 504800 | 5319750 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4301 | 501100 | 5317050 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4302 | 501000 | 5319000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 55 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4303 | 493650 | 5321100 | Tr | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 50 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4304 | 498100 | 5324450 | Tr | 0 | 0 | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4305 | 496900 | 5325900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4306 | 500250 | 5327750 | Tr | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 30 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4308 | 493041 | 5333549 | Tr | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4309 | 491200 | 5339750 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0 | 15 | 0 | 10 | 10 | 0 | 50 | 0 |
| 95-AFB-4310 | 483700 | 5335200 | Tr | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 2 | Tr | 15 | 0 | 5 | Tr | 0 | 0 | 0 |
| 95-AFB-4311 | 484800 | 5332800 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0.5 | 2 | Tr | 30 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4312 | 479750 | 5329400 | 0 | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4313 | 488950 | 5322050 | Tr | Tr | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4314 | 481100 | 5319550 | Tr | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 5 | Tr | 125 | Tr | 0.5 | 0.5 | 0 | 0 | 0 |
| 95-AFB-4315 | 475700 | 5317200 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Tr | 3 | Tr | 50 | 0 | 1 | 2 | 3 | 0 | 0 |
| 95-AFB-4316 | 469300 | 5318100 | Tr | Tr | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4317 | 463550 | 5322250 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | 0 | 10 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4318 | 466200 | 5321550 | Tr | Tr | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4320 | 472100 | 5326050 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4321 | 466479 | 5326462 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | Tr | 25 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4322 | 464450 | 5327700 | Tr | Tr | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 2 | 0.5 | 75 | 0 | 0.5 | 1 | 1 | 0 | 0 |
| 95-AFB-4323 | 476650 | 5335650 | Tr | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 20 | Tr | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4501 | 485950 | 5324650 | Tr | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 15 | 0 | Tr | Tr | 1 | 0 | 0 |
| 95-AFB-4502 | 485700 | 5325950 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 1 | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4503 | 485100 | 5327300 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | 0.5 | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4505 | 484550 | 5328900 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4506 | 484850 | 5330250 | Tr | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | 1 | 30 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4508 | 486400 | 5330450 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4511 | 489300 | 5331100 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 15 | 0 | Tr | 1 | 1 | 0 | 0 |
| 95-AFB-4513 | 490400 | 5330900 | Tr | 0.5 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 0.5 | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4515 | 488250 | 5334350 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 0.5 | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4519 | 490400 | 5334350 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 1 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4521 | 491100 | 5335950 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4522 | 492700 | 5336850 | Tr | Tr | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4524 | 494350 | 5339800 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 40 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4525 | 494750 | 5337200 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 0.5 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4527 | 494900 | 5335250 | 1 | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 0.5 | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4528 | 494550 | 5333600 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0.5 | 0.5 | 60 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4529 | 493700 | 5331750 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | Tr | 1 | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4533 | 493300 | 5340750 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Tr | 1 | 3 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4536 | 480250 | 5325850 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | 0.5 | 150 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4538 | 480850 | 5331250 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 2 | 1 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4540 | 480000 | 5332750 | Tr | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 1 | 20 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4542 | 480950 | 5334450 | Tr | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4544 | 477000 | 5338600 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 3 | 0.5 | 15 | 0 | Tr | Tr | 2 | 0 | 0 |
| 95-AFB-4545 | 475400 | 5339300 | Tr | Tr | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 20 | 1 | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4546 | 475150 | 5340650 | Tr | Tr | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 20 | 0.5 | 15 | 0 | 0 | Tr | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4547 | 475100 | 5342650 | Tr | Tr | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 45 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4551 | 482250 | 5343400 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0.5 | 2 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4552 | 481500 | 5342450 | Tr | Tr | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 1 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4553 | 482750 | 5341350 | Tr | Tr | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 3 | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4554 | 486300 | 5341600 | Tr | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4556 | 486100 | 5339050 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 3 | 1 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4558 | 487550 | 5343150 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4559 | 488550 | 5342500 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 0.5 | 0.5 | 15 | 0 | Tr | 0 | 1 | 0 | 0 |
| 95-AFB-4561 | 482700 | 5339150 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | Tr | 15 | 0 | 0.5 | 0 | 2 | 0 | 0 |
| 95-AFB-4562 | 481850 | 5340200 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | Tr | 10 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4563 | 478750 | 5341100 | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4565 | 497700 | 5317350 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | 0.5 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4566 | 498750 | 5320050 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | 0.5 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4567 | 500050 | 5322100 | 0 | Tr | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4568 | 501950 | 5322900 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 1 | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4569 | 504250 | 5322700 | 0 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4570 | 507300 | 5322100 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 2 | 1 | 30 | 0 | 3 | 3 | 0 | 0 | 0 |
| 95-AFB-4571 | 506650 | 5320500 | Tr | Tr | 3 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | 0.5 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4573 | 506400 | 5318650 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4581 | 504450 | 5325300 | Tr | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Tr | 1 | 1 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4582 | 503000 | 5326350 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | Tr | 40 | 0 | 1 | Tr | 0 | 0 | 0 |
| 95-AFB-4585 | 535150 | 5317150 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4588 | 534800 | 5319550 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4590 | 535700 | 5321350 | 0 | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4592 | 536950 | 5322800 | 0 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4594 | 535950 | 5319800 | Tr | Tr | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | 2 | 0 | 0 | 0 | 0 |
| 95-AFB-4595 | 536900 | 5321050 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4597 | 536400 | 5318000 | Tr | Tr | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | 2 | 0 | 0 | 0 | 0 |
| 95-AFB-4598 | 536150 | 5315850 | Tr | Tr | 1 | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4602 | 533450 | 5321050 | Tr | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4603 | 484000 | 5316200 | Tr | Tr | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 0.5 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4605 | 487800 | 5330750 | 0 | Tr | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | 0.5 | 20 | 0 | 0.5 | 0 | 2 | 0 | 0 |
| 95-AFB-4606 | 505400 | 5328950 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | Tr | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4607 | 534800 | 5322750 | 0 | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 0.5 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4608 | 535550 | 5323100 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4609 | 535850 | 5324300 | 0 | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4610 | 531950 | 5322550 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4611 | 536500 | 5325500 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | 2 | Tr | 0 | 0 | 0 |
| 95-AFB-4612 | 536700 | 5324000 | 0 | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4616 | 534950 | 5328450 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 10 | 0 | 2 | 0 | 0 | 0 | 0 |
| 95-AFB-4617 | 535050 | 5329750 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | 3 | Tr | 0 | 0 | 0 |
| 95-AFB-4618 | 537200 | 5328800 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4619 | 531450 | 5334350 | Tr | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 75 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4620 | 483700 | 5323100 | Tr | Tr | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 25 | 2 | 30 | 0 | 1 | Tr | 0 | 0 | 0 |
| 95-AFB-4621 | 484100 | 5321650 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Tr | 75 | 0 | 1 | 0.5 | 0 | 0 | 0 |
| 95-AFB-4623 | 477250 | 5325500 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | Tr | 125 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4624 | 475950 | 5323150 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 2 | Tr | 20 | 0 | 0.5 | 1 | 0 | 0 | 0 |
| 95-AFB-4625 | 478100 | 5328750 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 4 | Tr | 45 | 0 | Tr | 0 | 1 | 0 | 0 |
| 95-AFB-4626 | 477200 | 5326950 | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0.5 | 3 | Tr | 60 | 0 | 1 | 2 | 1 | 0 | 0 |
| 95-AFB-4627 | 495150 | 5324150 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 | Tr | 40 | 0 | Tr | 6 | 0 | 0 | 0 |
| 95-AFB-4629 | 493550 | 5325750 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 1 | 60 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4630 | 483100 | 5338350 | 1 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | Tr | 25 | 0 | 1 | 1 | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95-AFB-4631 | 484550 | 5338750 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 0.5 | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 95-AFB-4632 | 484000 | 5340100 | Tr | Tr | 3 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 6 | Tr | Tr | 30 | 0 | 1 | Tr | 0 | 0 | 0 |
| 95-AFB-4633 | 480600 | 5339650 | Tr | Tr | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | Tr | 15 | 0 | 0.5 | 0 | 0 | 0 | 0 |
| 95-AFB-4634 | 479750 | 5341650 | Tr | Tr | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 1 | Tr | 10 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4635 | 480550 | 5343200 | Tr | Tr | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 10 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4636 | 501600 | 5324950 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | Tr | 100 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4637 | 501150 | 5323650 | 0 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Tr | 20 | 0 | 1 | Tr | 0 | 0 | 0 |
| 95-AFB-4638 | 483660 | 5334300 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 1 | 20 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4639 | 484900 | 5334500 | Tr | 0.5 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 1 | Tr | 60 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 95-AFB-4640 | 482050 | 5331900 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | Tr | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4641 | 462850 | 5316000 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 0.5 | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4644 | 465150 | 5315850 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4645 | 466750 | 5316200 | Tr | 0 | 6 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | 1 | 40 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4646 | 466400 | 5318750 | Tr | Tr | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | Tr | Tr | 100 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4648 | 467750 | 5322250 | Tr | Tr | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Tr | Tr | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4649 | 519100 | 5317400 | Tr | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | Tr | Tr | 80 | 0 | 1 | Tr | 0 | 0 | 0 |
| 95-AFB-4650 | 518800 | 5320250 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 4 | Tr | 10 | 0 | 0.5 | 0 | 0 | 0 | 0 |
| 95-AFB-4651 | 470850 | 5317250 | Tr | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | Tr | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4652 | 471800 | 5319500 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | Tr | 10 | 0 | 1 | 0 | 0 | 0 | 0 |
| 95-AFB-4653 | 470300 | 5321800 | Tr | Tr | 2 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 0.5 | Tr | 75 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4654 | 469000 | 5325150 | Tr | Tr | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 2 | 50 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4656 | 481050 | 5330200 | 0.5 | 0.5 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0.5 | 40 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4657 | 483950 | 5341600 | Tr | Tr | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 35 | 0 | Tr | Tr | 0 | 0 | 0 |
| 95-AFB-4659 | 481000 | 5337200 | Tr | Tr | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 30 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 95-AFB-4660 | 523000 | 5316250 | Tr | Tr | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 4 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4661 | 523350 | 5317600 | Tr | Tr | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.5 | 2 | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 95-AFB-4662 | 512950 | 5318050 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 | 0.5 | 35 | 0 | 0 | Tr | 0 | 0 | 0 |
| 95-AFB-4663 | 495550 | 5319400 | Tr | 0.5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | Tr | 1 | 60 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4006 | 516255 | 5315700 | Tr | Tr | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | 2 | 100 | 0 | 0 | Tr | 0 | 0 | 0 |
| 96-AFB-4007 | 522205 | 5315190 | Tr | 0.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | Tr | Tr | 100 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4009 | 522840 | 5313025 | Tr | Tr | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | 5 | 200 | 0 | Tr | Tr | 2 | 50 | Tr |
| 96-AFB-4010 | 521600 | 5312825 | 0 | Tr | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 30 | 0 | 1 | 0.5 | 0 | 0 | 0 |
| 96-AFB-4025 | 524335 | 5310420 | Tr | Tr | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 80 | 0 | Tr | 3 | 1 | 0 | 0 |
| 96-AFB-4043 | 522605 | 5310140 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4044 | 512895 | 5315920 | Tr | Tr | 2 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 1 | 0 | 0 | 5 | 2 | Tr | 75 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4046 | 523975 | 5311690 | Tr | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 | 4 | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4048 | 522105 | 5311295 | Tr | 1 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | 1 | 0 | 0 | 0 | 0 |
| 96-AFB-4049 | 520270 | 5308555 | Tr | Tr | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | Tr | Tr | 35 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4052 | 534800 | 5314850 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4054 | 533550 | 5314300 | 0 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4057 | 532600 | 5312450 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 20 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4058 | 532575 | 5311530 | Tr | Tr | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 | Tr | Tr | 20 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4061 | 530700 | 5311800 | 0 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4062 | 528981 | 5311800 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | Tr | Tr | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4063 | 528955 | 5312965 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | Tr | 0 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4064 | 528005 | 5314175 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 0 | 30 | 0 | 2 | Tr | 0 | 0 | 0 |
| 96-AFB-4066 | 529695 | 5314600 | 0 | Tr | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 4 | 100 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4068 | 529665 | 5315620 | Tr | Tr | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 3 | Tr | Tr | 25 | 0 | 1 | 0 | 0 | 0 | 0 |
| 96-AFB-4069 | 530150 | 5309990 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 30 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4070 | 536090 | 5309520 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | Tr | 20 | 0 | 1 | 0 | 0 | 0 | 0 |
| 96-AFB-4081 | 507975 | 5316030 | Tr | Tr | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 50 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4084 | 507755 | 5314760 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 30 | 0 | Tr | Tr | 0 | 0 | 0 |

| SAMPLE # | Easting | Northing | %KY | %SIL | #RR | #GA | #SP | #CD | #CO | #TO | #SA | #ANDR | #EP | #GR | #ANDA | %ST | %OL | %OPX | #CR | %SPS | %GTH | %PY | #CPY | % BA | %FL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96-AFB-4086 | 506530 | 5310755 | Tr | Tr | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Tr | 0.5 | Tr | 70 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4087 | 507300 | 5308245 | Tr | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0.5 | 85 | 0 | 2 | Tr | 0 | 0 | 0 |
| 96-AFB-4092 | 517480 | 5315120 | Tr | Tr | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 25 | 0 | 2 | 0 | 0 | 0 | 0 |
| 96-AFB-4094 | 520665 | 5312295 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 15 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4096 | 504965 | 5317885 | Tr | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Tr | 20 | 0 | 1 | Tr | 0 | 0 | 0 |
| 96-AFB-4097 | 503395 | 5317540 | Tr | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Tr | Tr | 25 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 96-AFB-4098 | 504735 | 5316725 | 0 | Tr | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 175 | 0 | 2 | 4 | 0 | 0 | 0 |
| 96-AFB-4099 | 506423 | 5315645 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 50 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4100 | 503425 | 5314530 | Tr | Tr | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | Tr | 50 | 0 | Tr | 0.5 | 0 | 0 | 0 |
| 96-AFB-4101 | 502960 | 5312930 | Tr | Tr | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 0.5 | 40 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4102 | 504765 | 5314755 | Tr | Tr | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0.5 | 0 | 100 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4103 | 505930 | 5312210 | Tr | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | Tr | 150 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4104 | 509250 | 5311780 | Tr | Tr | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 80 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4105 | 510305 | 5313650 | Tr | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 100 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4106 | 511615 | 5313030 | Tr | 0.5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 3 | 25 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4107 | 511140 | 5315425 | Tr | 1 | 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 2 | 15 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4110 | 513850 | 5314705 | Tr | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 75 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4111 | 516620 | 5312760 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4112 | 517820 | 5313835 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | Tr | 35 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4113 | 521110 | 5314720 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | 0.5 | 0.5 | 50 | 0 | 0.5 | Tr | 0 | 0 | 0 |
| 96-AFB-4115 | 523985 | 5315695 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Tr | 60 | 0 | Tr | 3 | 0 | 0 | 0 |
| 96-AFB-4117 | 524666 | 5312970 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | Tr | 1 | 15 | 0 | 10 | 25 | 0 | 0 | 0 |
| 96-AFB-4118 | 524906 | 5311175 | Tr | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 4 | 0.5 | 25 | 0 | Tr | Tr | 0 | 0 | 0 |
| 96-AFB-4119 | 526060 | 5310915 | 0 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 1 | Tr | 40 | 0 | Tr | 3 | 0 | 0 | 0 |
| 96-AFB-4120 | 525265 | 5314390 | Tr | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.5 | Tr | Tr | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 96-AFB-4121 | 528250 | 5315990 | 0 | Tr | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 15 | 0 | 5 | 1 | 4 | 0 | 0 |
| 96-AFB-4122 | 532390 | 5315830 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Tr | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 50 | 0 |
| 96-AFB-4123 | 532800 | 5313355 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | Tr | 0.5 | 20 | 0 | 5 | Tr | 0 | 0 | 0 |
| 96-AFB-4124 | 534300 | 5312755 | 0.5 | Tr | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 0.5 | 120 | 0 | 1 | 0 | 0 | 0 | 0 |
| 96-AFB-4125 | 532700 | 5310835 | Tr | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 30 | 0 | 7 | Tr | 0 | 0 | 0 |
| 96-AFB-4126 | 528770 | 5308130 | Tr | Tr | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | Tr | Tr | 10 | 0 | Tr | 0 | 0 | 0 | 0 |
| 96-AFB-4127 | 528780 | 5309035 | Tr | Tr | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | 0.5 | 100 | 0 | 5 | 0 | 0 | 5 | 5 |
| 96-AFB-4128 | 518360 | 5316280 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0.5 | Tr | 15 | 0 | 0.5 | 1 | 0 | 0 | 0 |
| 96-AFB-4151 | 507705 | 5317460 | 0 | Tr | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 0.5 | 70 | 0 | 2 | 0 | 0 | 0 | 0 |
| 96-AFB-4175 | 508370 | 5318225 | 0.5 | 0.5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | Tr | 150 | 0 | 2 | 0 | 0 | 0 | 0 |
| 96-AFB-4176 | 523530 | 5310205 | Tr | Tr | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Tr | Tr | 150 | 0 | 2 | 0 | 0 | 0 | 0 |

# Metric Conversion Table

| Conversion from SI to Imperial | | | Conversion from Imperial to SI | | |
|---|---|---|---|---|---|
| *SI Unit* | *Multiplied by* | *Gives* | *Imperial Unit* | *Multiplied by* | *Gives* |
| | | | LENGTH | | |
| 1 mm | 0.039 37 | inches | 1 inch | **25.4** | mm |
| 1 cm | 0.393 70 | inches | 1 inch | **2.54** | cm |
| 1 m | 3.280 84 | feet | 1 foot | **0.304 8** | m |
| 1 m | 0.049 709 | chains | 1 chain | 20.116 8 | m |
| 1 km | 0.621 371 | miles (statute) | 1 mile (statute) | **1.609 344** | km |
| | | | AREA | | |
| 1 cm$^2$ | 0.155 0 | square inches | 1 square inch | **6.451 6** | cm$^2$ |
| 1 m$^2$ | 10.763 9 | square feet | 1 square foot | **0.092 903 04** | m$^2$ |
| 1 km$^2$ | 0.386 10 | square miles | 1 square mile | 2.589 988 | km$^2$ |
| 1 ha | 2.471 054 | acres | 1 acre | 0.404 685 6 | ha |
| | | | VOLUME | | |
| 1 cm$^3$ | 0.061 023 | cubic inches | 1 cubic inch | **16.387 064** | cm$^3$ |
| 1 m$^3$ | 35.314 7 | cubic feet | 1 cubic foot | 0.028 316 85 | m$^3$ |
| 1 m$^3$ | 1.307 951 | cubic yards | 1 cubic yard | 0.764 554 86 | m$^3$ |
| | | | CAPACITY | | |
| 1 L | 1.759 755 | pints | 1 pint | 0.568 261 | L |
| 1 L | 0.879 877 | quarts | 1 quart | 1.136 522 | L |
| 1 L | 0.219 969 | gallons | 1 gallon | **4.546 090** | L |
| | | | MASS | | |
| 1 g | 0.035 273 962 | ounces (avdp) | 1 ounce (avdp) | 28.349 523 | g |
| 1 g | 0.032 150 747 | ounces (troy) | 1 ounce (troy) | **31.103 476 8** | g |
| 1 kg | 2.204 622 6 | pounds (avdp) | 1 pound (avdp) | **0.453 592 37** | kg |
| 1 kg | 0.001 102 3 | tons (short) | 1 ton (short) | **907.184 74** | kg |
| 1 t | 1.102 311 3 | tons (short) | 1 ton (short) | **0.907 184 74** | t |
| 1 kg | 0.000 984 21 | tons (long) | 1 ton (long) | **1016.046 908 8** | kg |
| 1 t | 0.984 206 5 | tons (long) | 1 ton (long) | **1.016 046 90** | t |
| | | | CONCENTRATION | | |
| 1 g/t | 0.029 166 6 | ounce (troy)/ ton (short) | 1 ounce (troy)/ ton (short) | 34.285 714 2 | g/t |
| 1 g/t | 0.583 333 33 | pennyweights/ ton (short) | 1 pennyweight/ ton (short) | 1.714 285 7 | g/t |

## OTHER USEFUL CONVERSION FACTORS

| | *Multiplied by* | |
|---|---|---|
| 1 ounce (troy) per ton (short) | 31.103 477 | grams per ton (short) |
| 1 gram per ton (short) | 0.032 151 | ounces (troy) per ton (short) |
| 1 ounce (troy) per ton (short) | 20.0 | pennyweights per ton (short) |
| 1 pennyweight per ton (short) | 0.05 | ounces (troy) per ton (short) |

*Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.*